THE

AMERICAN REVIEW OF TUBERCULOSIS

ABSTRACTS OF TUBERCULOSIS

VOLUME XIII MAY, 1926 ABST. No. 5

Tonic Reflexes of Neck in Tuberculous Meningitis.—As tuberculous meningitis is very often basilar and frequently interpeduncular, it involves that region, transection of which in the animal results in decerebration. It was on this basis that it was suspected that the tonic neck reflexes of Magnus and Kleijn, as observed in decerebrate animals, might be elicited in cases of tuberculous meningitis in children. Of 21 cases of this disease, positive results were obtained in 10. With the child flat on its back the head is rotated to one side so that the chin points to the shoulder. When the reflex is positive, after a short latent period of a few seconds, one or both limbs on the side to which the chin is turned become extended, show the tendency to extension, or at least become hypertonic, while those of the other side tend to flex and become less rigid. A spontaneous Babinski sign may be observed on the side of the occiput. These reflexes were obtained with greatest frequency in children below 3 years of age. It is concluded that the sign is of physiological and anatomic and not special pathological significance, since any lesion at the midbrain level may give rise to it. The sign was not elicited in other forms of meningitis.—*Tonic Neck Reflexes in Tuberculous Meningitis in Children, I. S. Wechsler, J. Am. M. Ass., August 15, 1925, lxxv, 510.*—(*E. H. K.*)

Etiology of Lupus Erythematosus.—The cause of all cases of lupus erythematosus is not the same. Although numerous authors consider it an atypical form of skin tuberculosis, there is no question that some cases are altogether free from tuberculosis. On the other hand, association with pyogenic bacteria has frequently been noted. It must be admitted that inoculation experiments and other tests have apparently proved the tuberculous nature of some cases. The hypothesis that it is of varying origin best fits the known facts.—*Zur Klinik und Aetiologie des Lupus erythematodes acutus, H. W. Siemens, München. med. Wchnschr., June 19, 1925, lxxii, 1023.*—(*E. R. L.*)

Lupus Erythematosus Complicated by Erythema Centrifugum.—A case of combined lupus erythematosus and erythema centrifugum is described. The histological picture furnished no evidence of tuberculosis. The author doubts that tuberculosis is of etiological moment, and thinks that chlorosis, anemia, stomach and intestinal diseases, dysmenorrhea and particularly chilling, are important causes. Naturally, tuberculosis may coexist.—*Zur Kasuistik des Lupus erythematodes kombiniert mit Erythema centrifugum, W. Richter, München. med. Wchnschr., June 19, 1925, lxxii, 1026.*—(*E. R. L.*)

Treatment of Lupus by Ionization.—A case of extensive involvement, in a young man of 18, successfully treated by this method, is reported in detail. The patient had suffered from lupus on the buttocks since two years of age and when first seen the disease was in active progress. The anus was not involved. *Technique:* The affected area was cleansed with warm water and soap, and then sponged over with 5 per cent potassium hydrate, which was removed with warm water after three minutes; this was to remove the resistant layer covering the tubercles. The patient then sat in a papier-mache bowl on eight thicknesses of Turkish towel, under which was an electrode eight inches square. The bowl contained a 2 per cent zinc-sulphate solution, and the positive lead of the current was connected to the electrode, the negative pole being a similar bowl containing a 1 per cent solution, into which the patient put his feet. The

scrotum was protected by anointing with soft paraffin. The current was slowly turned on and increased to 40–50 *ma*, continued for ninety minutes. Treatment was repeated at fourteen-day intervals. Improvement was soon manifest. The advancing edge cleared up in about three months, but the old tubercles were more resistant. There was usually a reaction two or three days afterward, lasting a few days, during which a clean dressing was worn. At the end of the second year the disease had practically disappeared, but treatment was continued for another year.—*Treatment of Lupus by Ionization, J. B. Whitfield, Lancet, May 16, 1925, ccviii, 1026.—(A. P.)*

Treatment of Lupus Erythematosus with Aurophos.—This drug, while not specific, gives good results in lupus erythematosus and its use should be further experimented with.—*Erfahrungen mit "Aurophos," einem neuen Goldpräparat zur Behandlung des Lupus erythematosus und vulgaris, A. Kropatsch, Wien. klin. Wchnschr., November 12, 1925, xxxviii, 1239.—(H. S. W.)*

Primary Inoculation Tuberculosis of Skin.—The literature is summarized and 10 cases of undoubted inoculation tuberculosis of the skin observed at the Mayo Clinic are described. Inoculation tuberculosis of the skin is known to most physicians as the so called postmortem wart (*verruca necrogenica*) or as *tuberculosis verrucosa cutis*. Clinically, verrucosa cutis and primary inoculation tuberculosis of the type described can be quite sharply differentiated. The verrucous form consists of a warty, horny inflammatory papule, with villi studding the surface. There is little deep infiltration, most of the activity being confined to the upper corium in association with the verrucous changes in the epidermis. In the primary inoculation tuberculosis discussed here, there is no verrucous hypertrophy. The essential lesion is a tubercle, the apple-jelly nodule, rather deeper than in the verrucous forms, better defined and less involved in general tissue reaction. The lesion, clinically, is usually flat, and consists of a group of miliary nodules around a central slightly depressed scar or superficial ulcer. Its identification by diascopic pressure is the first aid to a diagnosis. These cases are equally distributed between the two sexes and in childhood, adolescence and adult life. They suggest that reaction to tuberculous infection and its sequellae varies with the individual and with circumstances, rather than entirely with previous infection and acquired resistance. The primary lesion may be confused with syphilitic chancre sporotrichosis, actinomycosis and epithelioma; the lymphatic metastatic lesions with lymphosarcoma and simple inflammatory bubo. A painless and indolent lymphangitis may be the only symptom attracting attention in cases primary on the arm, and this may only become visible on the fullest extension of the arm above the head. A delayed adenopathy, developing even after trifling trauma, should lead to examination of the lymphatic drainage area for a tuberculous inoculation focus. A primary focus may serve throughout a period of months or years as a feeder to a lymphatic lesion, and be responsible for repeated recurrences of adenitis in spite of drainage, curettage and excision. Scrofulodermatous ulceration of the skin may result at the site of the metastatic lesion. Roentgen ray carried to the point of reaction may not destroy the primary focus or retard its "feeder" activities. Excision of the primary focus, even if it is only a scar, and of its secondary lymph nodes is necessary to the best treatment, and should be carried out whenever possible. In dealing with the focus it is usual to find that the tubercles extend much deeper than might be anticipated, and excision should, therefore, be carried to the fascia and widely marginated. Radium controls the lymphatic metastatic lesion and is preferable to the roentgen ray, after excision, in the treatment of the excision scars and drainage areas. Large doses, properly screened, should be used but not carried to excess. Ultraviolet light, from the quartz lamp, can be used locally with pressure in lesions that cannot be excised and should be employed systematically in the form of general irradiation and artificial heliotherapy. Moderate doses of neoarsphenamin, which contribute to a good result in cases of tuberculids and in some cases of tuberculous adenitis, may be used in the treatment of primary inoculation tuberculosis as part of the general management of the case. The article is illustrated.—*Primary Inoculation Tuberculosis of the Skin with Metastasis to Regional Lymph Nodes, J. H. Stokes, Am. J. M. Sc., May, 1925, clxix, 722.—(J. S. W.)*

Treatment of Lupus with Pyotropin and Other Drugs.—*Pyotropin* produces results that one might expect from the application of lye. The remedy cannot be recommended as a panacea, although 7 out of 26 cases of cutaneous tuberculosis appeared to be cured and 8 were much improved. The remedy is in no way specific. Potash lye in weak solution and creosote produce about the same percentage of good results and with less cosmetic damage than *Pyotropin*, but the course of treatment is longer. *Pyotropin*, because of its rapid action, constitutes an

advance in the treatment by corrosive preparations. It does not, however, replace X-rays, ultraviolet light or other means of therapy. *Lupusex*, a preparation containing twelve ingredients—borax, balsam of Peru, phenol, glycerine, cocaine, mercury, zinc chloride, sodium chloride, sulphur, etc.—has been used for lupus and satisfactory results claimed. The remedy lessens the pain and eliminates the scales, but does not appear to alter the course of the disease (only a few cases). Another remedy, *Triphal*, has also been recommended. This is a gold preparation, administered intravenously. Frequently focal reactions occur after the injection. Of 7 cases of lupus 3 showed transient but not permanent improvement, in 2 progression of the disease followed, and in 2 no results were noted. In lupus erythematosus results were much more gratifying, several cases appearing to be healed, but some developed a recurrence after discontinuance of the drug. But while a few cases do well the large majority of cases show no such favorable response.—*Neuere Heilmittel zur Behandlung der Hauttuberkulose, P. Wichmann, Deutsche med. Wchnschr., June 26, 1925, li, 1072.*—(*H. S. W.*)

Treatment of Lupus with Pyotropin.—*Pyotropin* has been found to be an excellent therapeutic agent for lupus. It is a preparation containing phenol, potassium, salicylic acid and other ingredients, and may be used in the form of a liquid or a salve. Many cases are healed in six weeks, whether the disease involves skin or conjunctiva, buccal or pharyngeal mucosa. It frequently happens that superficial healing occurs so promptly and satisfactorily that the patient fails to come back.—*Neue Bahnen der Lupusheilung, Axmann, Deutsche med. Wchnschr., April 3, 1925, li, 560.*—(*H. S. W.*)

Treatment of Lupus with Pyotropin.—The technique of the use of *Pyotropin* is given. Of all chemical modes of treatment yet devised for skin tuberculosis, this drug is by far the best, but it must be used intelligently, for when used routinely it will be found to have deleterious results in a few cases, especially if the lupus is complicated by rodent ulcers, epitheliomata or hyperkeratosis. The substance is very expensive.—*Ergebnisse unsere Pyotropinbehandlung beim Lupus, J. Callenberg, Deutsche med. Wchnschr., March 20, 1925, li, 472.*—(*H. S. W.*)

Treatment of Lupus with Chloramine.—Results from the use of *Chloramine* in lupus justifies the continuation of its use. It produces better cosmetic results but has disadvantages, such as the fact that it is absorbed and does damage to the kidney.—*Chloramin-Heyden zur Behandlung der Hauttuberkulose, H. Martenstein, Klin. Wchnschr., October 14, 1924, iii, 1912.*—(*H. S. W.*)

Significance of Erythema Nodosum.—This is an acute slightly febrile disease, characterized especially by nodose swellings on the legs which are hot, red and painful. Its immediate prognosis is good. However, numerous authors have affirmed on clinical grounds that it is not as insignificant as appears, but really a tuberculous manifestation. According to this conception it must be considered a danger signal. This interdependence of erythema nodosum and tuberculosis has received much attention in medical literature, and it might be said that most physicians now believe that erythema nodosum means tuberculosis. However, the association is not constant, even though common, and all the facts must be considered. *Argument for the hypothesis of the tuberculous nature of erythema nodosum: 1. Clinical:* It is frequent to find manifest or latent tuberculosis in subjects with erythema nodosum, and an exacerbation of the tuberculosis often ensues, especially in children, and may even be fatal, as acute miliary tuberculosis or meningitis. More often, however, the preëxisting tuberculosis is only slightly if at all modified, the graver sequellae being in a small minority of cases. *2. Biological:* In most cases the tuberculin skin reaction is not only positive but very intense and marked, with a red wheal the size of a two or even a five-franc piece, in the centre of which is a vesicle, bulla or pustule. A strongly positive cutireaction may be said to occur in 95 per cent of all cases, even though the clinical and radiological examination is negative or merely suspicious. However, in a small minority of cases the reaction is entirely negative and this may correspond with a good general condition, so that a state of anergy is not the cause. *3. Pathological:* Although histological examination of the lesions has always been negative, Troisier has reproduced erythematous nodular lesions by injection of tuberculin. *Recapitulation and discussion:* Although it is certainly shown that tuberculosis commonly coexists with erythema nodosum, the association is not so constant as to furnish a complete explanation. Clinicians have also noted an association with other infections, such as rheumatism, syphilis, malaria, leprosy and septicemia. Certain authors have also defended the idea of the autonomy or independence of this disease. Its mode of evolution, its febrile invasion, with gener-

alized eruption and constitutional symptoms, and ensuing desquamation, suggest this. It may also assume a contagious character and even become epidemic. The incubation period seems to be about two weeks. Recurrences are very unusual. As a portal of entry the throat seems to be more incriminated. An initial red angina, sometimes with herpes, seems to be most common, though often overlooked. The eruption occurs chiefly on the legs and is bilateral. It is incontestable that there is a primary eruptive form of the disease, as well as a form apparently secondary to other infectious diseases, especially tuberculosis. The tuberculous do seem especially sensitive to attack and, likewise, tuberculosis may be reactivated by the acute malady, although the consequences as a rule do not appear to be as serious as has been supposed. Meunier believes that erythema nodosum must be regarded as a specific infectious disease anolagous to the eruptive fevers but of ordinarily low infectivity, which may occur *de novo* or in association with debilitating diseases such as tuberculosis, rheumatism, and other infections. Cases are cited illustrating the behavior of erythema nodosum both with and without associated tuberculosis, that is, both the "pure" and the "mixed" forms of the malady. However, even in those cases with a tuberculous background we find traces of a more recent infection—sore throat, slight herpes, slight fever and transient albuminuria. Thus, despite appearances, the erythema is not strictly a tuberculous manifestation. In the last case reported there was also an arthritis which recurred a week after the fever subsided.—*La signification de l'érythème nodeux, M. Meunier, Rev. Belge de la Tuberculose, November, 1924, no. 11, 321.*—(*A. P.*)

Relation of Angiokeratoma to Tuberculosis.—As a result of a review of the author's own clinical cases and of the literature, angiokeratomatous affections are classified into three groups. A tuberculous origin of *Angiokeratoma Mibelli*, as maintained by the French authors, is denied.—*A Contribution of the Pathology and Groups of Angiokeratoma, Especially on its Relation with Tuberculosis, M. Itoh, Hifuka Hitsunyokika Zasshi, 1924, xxiv, no. 12, Abstract from Japan Medical World, 1925, v, 110.*—(*M. M.*)

Cause of Renal Tuberculosis.—There are many strains of human tubercle bacilli with different pathogenic properties. Three strains, isolated from the urine, have failed to produce disease in guinea pigs, but at operation the patient had advanced renal tuberculosis. One of these grew quite like one of the nonpathogenic acid-fast bacilli, and failed to produce tuberculosis in guinea pigs. In pulmonary tuberculosis, it is more difficult to find different strains. For an antigen to be efficacious in tuberculosis, it must be prepared from the specific strain that has caused the disease.—*Beitrag zur Aetiologie der Nierentuberkulose, E. Löwenstein, Wien. klin. Wchnschr., July 16, 1925, xxxviii, 803.*—(*H. S. W.*)

Late Results of Renal Tuberculosis.—Nephrectomy is considered the best treatment for renal tuberculosis, and patients are advised to undergo operation as soon as possible after being diagnosed. It is shown that: 1. Renal tuberculosis treated by nonoperative methods is generally fatal. About 90 per cent of the patients die from the direct effects of their infection. 2. The majority of the so called cures are really cases in which the kidney becomes occluded, and the tuberculous process is not arrested, but is merely shut off from the rest of the urinary tract. 3. There are a few instances in which a portion of the kidney has become occluded while the remainder of the organ continues to functionate, but they are so rare that they are pathological curiosities. Further, these cases are not cured, as they still suffer from a closed tuberculous focus. The possibility of a natural cure of renal tuberculosis which has reached a stage that can be diagnosed by clinical methods has not yet been proved. The results of nephrectomy show that the total mortality is about 20 per cent; the cures amount to almost 60 per cent, while the remaining patients still suffer from tuberculosis. Of 72 cases one-third were inoperable because they were, almost without exception, bilaterally infected. Nephrectomies were performed on the remaining 48 cases. If patients were sent for examination as soon as tubercle bacilli are found in the urine, there would be better results. A plea is made for bacteriological examination of the urine at least within twelve months of the onset of vesical symptoms.—*The Late Results of Renal Tuberculosis, J. Swift Joly, Brit. J. Tuberc., October, 1925, xix, 188.*—(*J. C. D.*)

Unusual Case of Renal Tuberculosis.—A tuberculous kidney removed from a man of 27 years showed confluent tuberculous granulations as well as a cavity at the upper pole. The kidney was interesting because of its hydronephrotic aspect, its massive infection, and as an illustration of two modes of infection, one by the bloodstream, the other ascending not from the bladder but from the ureter and renal pelvis. It is thought that the origin of this condition was a congenital dilatation of the ureter and

calyx.—*Tuberculose rénale, Oraison, Meeting, Soc. de Méd. et de Chirurgie de Bordeaux, February 6, 1925, reported in Presse Méd., March 21, 1925, no. 23, 378.*—(*E. H. K.*)

Frequency of Bilateral Renal Tuberculosis.—The reported frequency of bilateral renal tuberculosis has varied from 10 to 71 per cent of all cases, the latter being an autopsy figure. With these impressive figures in mind we cannot but realize that in cases of so called unilateral infection the apparently healthy kidney may often be tuberculous. Renal tuberculosis may be asymptomatic or "silent." At times even such objective findings as pus are absent. The condition is also subject to remissions, often of long duration. Moreover, partial occlusion may result in disappearance of pyuria and bacilli. The finding of tubercle bacilli is not an invariable criterion, even with animal inoculation. In examining smears much diligence and time are demanded, the proportion of positives being about 60 per cent at the Massachusetts General Hospital, and the highest reported figure (Wildbolz) 90 per cent. Of a group of 110 cases from the Urological Department of the Massachusetts General Hospital, in 14 per cent tubercle bacilli were never found prior to operation, diagnosis being made clinically and confirmed at operation. There must be considered the possibility of filtration of tubercle bacilli through a healthy kidney, observed and proved in 5 per cent of a series of cases at the Massachusetts General Hospital. The sediment of the supposedly sound side should always be carefully examined for pus, which was found present in 38 per cent of the Massachusetts General series. If it is present guinea-pig inoculation should be done. The obviously diseased kidney was removed in all cases in which no contralateral tuberculosis could be demonstrated, but 21 per cent of these subsequently developed tuberculosis of the remaining kidney. The highest mortality occurs in the first year of the disease. When the local symptoms or the appearance of the ureteric orifice are the least suspicious, or the phthalein output on this side diminished, or leucocytes present in the urine, exhaustive search should be made for tubercle bacilli.—*The Frequency of Bilateral Renal Tuberculosis, J. D. Barney and S. G. Jones, Boston, M. & S. J., September 17, 1925, cxciii, 540.*—(*A. P.*)

Origin of Tuberculosis of Bladder.—Tuberculous cystitis may result from three different modes of infection. First, primary tuberculosis of the bladder which, though rare, without doubt exists, since there is no reason pathologically why this organ should not be attacked primarily as well as any other organ of the body. It takes the form at first of simple granulations which appear like primary granulations and forerunners of ulcerative lesions to be followed by vegetative lesions. There is little or no associated cystitis, contrary to the state of affairs in secondary vesical tuberculosis. While the diagnosis of primary tuberculosis of the bladder is unfortunately doubtful and often one of exclusion, cystitis secondary to genital tuberculosis, the second mode of production, offers more certain recognition because here there is an anatomical basis for conviction. A case is cited in which double epididymectomy was followed by remarkable cure of the cystitis. Saxtorph, in 38 cases of vesical tuberculosis, observed 32 of renal, 29 of prostatic and 20 of seminal-vesicle tuberculosis. Third, making up the vast majority of cases, there is vesical tuberculosis secondary to renal infection. Thanks to the discovery of the cystoscope and ureteral catheterization, this condition has been well explored. Early nephrectomy, as advocated by Albanan, is advised and practised as the best means of combating the condition, especially in the unilateral form or in the bilateral form when the trouble is predominantly unilateral. In the vast majority of cases of tuberculous cystitis, especially among women, renal tuberculosis should be excluded first. Analysis of the urine from each kidney will show on the affected side a diminution of urea and chlorides. When analysis shows no such loss, other conditions must be thought of, or if tubercle bacilli are found, or animal inoculation is positive for tuberculosis, genital tuberculosis should be considered, and, failing signs of this, primary vesical tuberculosis. Contamination of the kidney from a tuberculous bladder is considered unlikely because it is against the constant current of urine. In short, while the majority of cases of tuberculous cystitis are of renal origin most often unilateral and therefore amenable to surgery, one should think of a genital origin, and of a primary infection, especially when there is little cystitis and the kidneys are not deficient. The frequency of these conditions is estimated as 80 per cent of renal origin, 15 per cent genital and 5 per cent primary. *Conclusions:* 1. All vesical tuberculosis disappearing completely after nephrectomy is secondary and of renal origin. 2. All vesical tuberculosis which does not disappear after nephrectomy is of genital origin if lesions are found in this tract. 3. All vesical tuberculosis which does not disappear after nephrectomy should be regarded as primary if no genital involvement is found.—*La trilogie tuberculeuse de la vessie, Cathelin,*

Prog. Méd., December 20, 1924, no. 52, 795.—(E. H. K.)

Treatment of Tuberculous Cystitis with Methylene Blue.—Great success is claimed for vesical instillations of methylene blue in cystitis accompanying renal tuberculosis, whether the case is operable or inoperable. There is no contraindication for its use. Ten to 15 cc. of a tepid 1 per cent solution are injected in the average case, and of a half per cent solution in acute or much improved cases. A 2 per cent solution is painful. If the bladder is very foul, lavage should be carried out first. In the average case the instillations should be repeated every two days; in severe cases, every three days. Four or five treatments give relief for a long time. It is better to resume treatment from time to time than to give prolonged treatment. At the same time methylene blue must be given by mouth. The dye has an antiseptic and anesthetic action. It becomes fixed exclusively in the infected area of the bladder. This method rapidly benefits pollakiuria, bladder and ureteral pains, and hematuria. The capacity of the bladder is considerably increased. One patient with bilateral renal tuberculosis urinated every half hour before treatment, but was able to retain urine for six hours after treatment. In cystitis with incontinence it exerts an ameliorating action.—*Un nouveau traitement de la cystite tuberculeuse, Marion and Blanc, Meeting, Soc. Française d' Urologie, February 16, 1925, reported in Presse Méd., March 7, 1925, no. 19, 306.—(E. H. K.)*

Origin and Spread of Male Genital Tuberculosis.—A clinical experience extending over a period of 18 years and including 87 cases is reported on. In 87 per cent of the cases the epididymis was involved, in 58 per cent the seminal vesicles, in 39 per cent the testicles, in 30 per cent the prostate and in 17 per cent the vas deferens. In 70 per cent there was tuberculosis of several organs. Twenty-three of the cases were treated conservatively, and 64 by operation. Treatment was conservative when several of the organs were involved coincidentally, or if there was a severe active tuberculosis existing. In 44 cases subsequent examinations were possible and of 8 of those treated conservatively 3 had died. Three cases, after temporary improvement, suffered relapse. In one case the condition was stationary and in one healing occurred. Of the operated cases (36), there were 20 which had only an isolated tuberculosis of the testicle, or epididymis, or both together homolaterally, and which were treated by orchidectomy or epididymectomy. Of these, only 2, or 10 per cent, did not recur. In the remaining 16 cases orchidectomy was performed in spite of the fact that other organs were involved, and only one of these did not become worse after the operation, while 9 died. Genital tuberculosis in males is considered always a secondary disease of hematogenous origin. The primary genital lesion can be seated in any of the organs. There is a marked tendency of the genital tuberculous lesion to rupture into blood-vessels.—*Zur Frage der Genese und Ausbreitung der männlichen Genitaltuberkulose, L. Sussig, Deutsche Ztschr. f. Chir., 1924, clxxxv, 145.—(H. J. C.)*

Orchidectomy in Male Genital Tuberculosis.—Pessimism often dominates prognosis when tuberculosis attacks the male genitalia, partly because such patients have tuberculosis elsewhere, especially in the lungs, and partly because the extent of the local disease often precludes its complete surgical eradication. The indications for orchidectomy differ from those of epididymovasectomy. The extent of involvement when the patient presents himself determines the choice, aided by the careful consideration of the general condition by the tuberculosis expert. *Technique:* If sinuses are present, these are sterilized with phenol and covered by sterile cotton and collodion. The entire operative area is then painted with iodine or mercurochrome soluble. Under procaine anesthesia the inguinal canal is opened and the cord drawn out. The vas deferens is isolated, doubly clamped, and divided by the actual cautery. The vessels of the cord are likewise doubly clamped and divided by the actual cautery, and the proximal stump is ligated and dropped back into the abdomen. The vas is secured in the wound in such a way that its proximal end can drain. This drainage, under heliotherapy, hygienic measures and controlled tuberculin administration, eventually ceases when the seminal vesicle is no longer actively diseased. The testis and epididymis, together with all obviously diseased tissue, must be carefully dissected free, leaving a clean scrotal wound. The distal ends of the vas and vessels are pushed gently down through the inguinal canal into the scrotum and released. A small temporary drain only is necessary.—*Technic for Orchidectomy, C. S. Vivian, J. Am. M. Ass., January 2, 1926, lxxxvi, 23.—(A. P.)*

Tuberculosis of the Vascular Bundle of Spermatic Cord.—The patient had a tuberculous focus involving the vascular bundle of the spermatic cord without injury to this organ or other genitourinary organs.

Following extirpation of the area, the testicle received sufficient blood supply from the uninjured artery of the vas deferens.—*Noyaux tuberculeux du paquet vasculaire du cordon sans lésion du canal déferent ni des autres organes génitourinaires, Darget and Guérin, Meeting, Soc. Anatomo-Clinique de Bordeaux, January, 1925, reported in Presse Méd., March 21, 1925, no. 23, 378.*—(*E. H. K.*)

Tuberculosis in Adenomatous Prostate.—A man of 36 years who had previously had epididymitis was cystoscoped, and an enlarged median lobe of the prostate found. Biopsy indicated a tuberculous lesion, but when prostatectomy was performed the suspected lobe was found to be adenomatous and to contain tuberculous areas.—*Tuberculose développée sur un adénome prostatique, Legueu and Verliac, Meeting, Soc. Française d'Urologie, April 27, 1925, reported in Presse Méd., May 20, 1925, no. 40, 665.*—(*E. H. K.*)

X-Ray Treatment of Female Peritoneal and Genital Tuberculosis.—Good results are reported from roentgen therapy of genital and peritoneal tuberculosis in the female. Of 24 cases thus treated 21 were healed. Radiation was carried on for periods of from 4 to 6 weeks, using 200 *kv.* and 2 *ma*, with a 1 mm. copper filter and a focal distance of 50 cm., initiated with $\frac{1}{8}$ to $\frac{1}{12}$ *HED*, and diminished at each exposure to $\frac{1}{16}$, $\frac{1}{24}$ and $\frac{1}{48}$ of the *HED*. The average number of radiations was four to six, although in individual cases more treatments were given in order to heal fistulae, especially with the lower doses. Aside from the roentgen treatment in the 24 cases none of the other usual therapeutic measures was used. It is believed that roentgen treatment with small doses has decided advantages over any other treatment for female genital and peritoneal tuberculosis, but the importance of definite diagnosis is emphasised.—*Die Röntgentherapie der Peritoneal- und Genitaltuberkulose, W. Uter, Centralbl. f. Gyn., 1924, xlviii, 1473.*—(*H. J. C.*)

Tuberculosis of Vagina.—This is one of the rarest of gynecological diseases. It has been generally considered almost invariably secondary to grave tuberculous disease of the uterus or tubes. A careful study of authenticated cases, however, shows that this view is not entirely correct, that frequently the vaginal lesion is the only tuberculous lesion of the reproductive organs, and occasionally the only active focus in the body and amenable to surgical treatment. This summary is based on a group of 39 authentic cases, one from personal practice, one from the Johns Hopkins Hospital wards, and 37 from the literature. *Incidence:* Among 30,000 gynecological patients of all types treated in the Johns Hopkins Hospital tuberculosis of the vagina was diagnosed twice. At necropsy it has been found more frequently, Schlimpert's figures from Dresden indicating involvement in 10 per cent of cases of genital tuberculosis. *Pathology:* The consensus of opinion is that tuberculosis of the female pelvic organs is rarely primary. Since Friedländer's case of primary vaginal tuberculosis, reported in 1873, there have been a bare half-dozen cases reported and not all of them have been corroborated by necropsy. Of 28 cases analyzed by Wharton which came to necropsy there was only one in which the pathologists failed to discover additional foci, and this one, Friedländer's case, has been the subject of controversy. However, the associated lesions do not always involve the internal genitalia; this is the case in only about 50 per cent. *Clinical features:* In some patients the only complaints are referred to the vagina. Local symptoms consist of persistent purulent discharge, pain, occasional bleeding, and incapacitation. The inguinal lymph nodes are apt to be much involved in children, and edema of the external genitalia is not uncommon in adults. The ulcers may be situated in any part of the vagina, most frequently the posterior surface of the lower third. In 13 of 32 instances the ulcer was solitary. On the granulations covering the depressed base, miliary tuberclous nodules have occasionally been found. Tubercle bacilli can be found in the tissue and occasionally in the secretions. The most difficult differential diagnosis is from syphilis. *Treatment:* When the lesion is sharply localized, the upper genital organs are normal and the general condition satisfactory, excision is the treatment of choice, under local or regional anesthesia, and including the inguinal lymph nodes if involved. In the majority of cases, to be sure, the presence of active tuberculous lesions elsewhere either prevents the adoption of surgical measures, or hastens dissemination following them. Conservative measures should therefore be first tried, and approved medical and hygienic treatment should be used. *Case report:* A woman, aged 46, suffered from delayed convalescence after dengue fever, accompanied by cough and pains in the hip, and some dyspnea on exertion. Vaginal symptoms began with nodular swellings in both lower quadrants, rather sensitive to touch. These later opened spontaneously, leaving ulcers which discharged. Chronic active bilateral apical tuberculosis was found on medical

examination, with a small amount of nonbacillary sputum. The mucosa of the lower third of the vagina was thickened and tender, and there was a granular area in the region of the left Bartholin's gland. On operation an ulcerated area 2 cm. wide was found, the margins blending gradually with normal mucosa. Miliary tubercles were scattered over the surface of the ulcer, and a few extended further. The entire local lesion was excised and the base cauterized. Convalescence was uneventful but the patient refused sanatorium treatment. The pathological report showed tuberculous tissue and bacilli. The later course was unsatisfactory, the disease spreading in the lungs and recurring in the vagina.—*Tuberculosis of the Vagina, L. R. Wharton, J. Am. M. Ass., July 25, 1925, lxxxv, 237.*—(*A. P.*)

Primary Tuberculosis of Bartholin's Gland.—A case of primary tuberculosis of Bartholin's gland occurred in a multipara, aged 24. This condition is very rare, only 3 cases being reported in the literature. *Conclusions:* This case is reported as primary tuberculosis of Bartholin's gland because careful examination, including exploration of the abdomen and X-ray examination of the chest, failed to reveal any other evidence of the disease. Probably the cases would be much more frequent if looked for.—*Primary Tuberculosis of Bartholin's Gland, J. W. Gordon, J. Am. M. Ass., June 13, 1925, lxxxiv, 1822.*—(*B. T. McM.*)

Addison's Disease.—Forty-seven cases of Addison's disease are reported in part, with special emphasis on the more recent cases (series 2), numbering 21, eleven of which received the Muirhead regimen. This treatment consists essentially in forced organotherapy with epinephrin in an attempt to combat functional insufficiency of the suprarenal glands. The incidence of Addison's disease at the Mayo Clinic was one in every 6,600 patients registering. Males are affected twice as often as females, and the average age of onset was approximately 40 years, the youngest patient being 14 and the oldest 68 years old. Influenza seemed to be the most important previous illness in relation to Addison's disease. The relationship, however, is more casual than direct. Pneumonia is second on the list, but in most instances it appeared as a complication of the influenza. Clinically, tuberculosis appeared to play a minor part; but, since tuberculous lesions of the suprarenals were found in all but one of the cases coming to necropsy it would appear that tuberculosis is frequently overlooked. In certain tuberculous cases, proved by necropsy, tuberculosis could not be positively diagnosed clinically; in some instances tuberculosis was active only in the suprarenals and quiescent elsewhere in the body. The onset of Addison's disease is usually insidious, the average duration of the disease among the recent group being sixteen and one-half months. The most important symptoms were found to be asthenia, pigmentation and hypotension, the first two being present in every case, though in varying degree. In the majority of cases they were marked and tended to run more or less parallel. Loss of weight was found to be an important symptom, the average loss in series 2 being 32 pounds. Dyspnea, collapse and syncope are probably related to the feeble cardiac action and low blood pressure. Such symptoms were found to be more pronounced throughout in certain cases than in others, and as a rule were more marked toward the end of the disease. The blood pressure averaged consistently low (90 average systolic) in nearly all the cases and the pulse rate ranged between 70 and 100, regular but weak and compressible. The urine was usually found normal, but a study of the blood in some cases showed diminished renal function, probably an accompaniment of the low blood pressure and the resulting circulatory disturbance. A study of the gastric contents showed the total and free acids to be low in every instance. Roentgen-ray examination of the chest disclosed evidences of tuberculosis in four cases. In the few cases studied the basal metabolic rate tended to be moderately lowered. Blood counts of both series of patients showed anemia to be infrequent, the average hemoglobin (Dare) being 73+ per cent. With regard to the pigmentation it was found that striking changes in the color of the skin occurred as a result of treatment. In order to determine these changes more readily, a tintometer was developed which proved very useful in following quantitatively the degrees of pigmentation. Necropsies were obtained in 9 cases, and the pathological involvement of the suprarenals and kidneys was confirmed at operation in another instance. In 8 of the former, tuberculous lesions were found; in the remaining case the process was one of high-grade atrophy. The prognosis depends on the nature of the underlying disease and on the patient's tolerance and response to suprarenal products. As the specific treatment is of value only by way of substitution, the outlook is extremely grave. Irrespective of treatment, in about two-thirds of the cases reported a fatal outcome resulted within a period of one year. The treatment known as the Muirhead regimen consists in the frequent administration of epinephrin

hypodermically and by rectum, and of whole gland or suprarenal cortex by mouth to the point of tolerance. The greatest difficulty in long-continued treatment comes from the whole gland by mouth because of digestive disturbances. Other therapeutic factors, such as rest, exercise, diet, outdoor life and sunshine, merit consideration. In the advanced stage, and especially during shock, rest in bed should be absolute, and artificial heat is indicated. A diet rich in carbohydrates with frequent feedings is required. With regard to the 21 patients in series 2, four receiving no treatment, all died within four months, and of four receiving partial treatment three died within a similar period. Of the 12 patients on the Muirhead regimen, 5 are dead and 7 living. Of the latter, notable results were obtained in five instances, three of these being in excellent health, in view of the circumstances, and are continuing treatment after the lapse of from twenty to twenty-six months. The treatment probably exerts no influence on the fundamental pathological processes underlying the Addisonian manifestations. Since nothing better is available, the Muirhead treatment should be given a fair trial in every case of Addison's disease, care being exercised, however, to see that the patient's individual tolerance is determined and given due consideration, and that simultaneously every measure is utilized in combating the associated symptoms and the underlying pathological process.—*Studies in Addison's Disease, L. G. Rowntree, J. Am. M. Ass., January 3, 1925, lxxxiv, 327.*—*(J. S. W.)*

Chronic Miliary Tuberculosis of Lungs.—In May, 1924, the author of this article collaborated with Sayé in describing a form of torpid chronic miliary tuberculosis. Brief clinical histories and X-ray findings in 10 such cases were given and an additional 10 cases had been collected. Although some autopsy reports were then given there was never any histological examination. The present case is complete. The patient was accidentally discovered to have pulmonary tuberculosis when he consulted a specialist for a chronic ear complaint. The condition suggested tuberculosis, and X-ray examination showed the picture of chronic miliary disease of the lungs. The few symptoms were very mild: a little fever now and then, a little cough without expectoration, slight loss of weight, and a pulse of 90. The patient was ambulant and without dyspnea. After an uneventful month at Leysin he became suddenly ill with symptoms of a brain lesion. Mastoid disease was suspected and an operation was performed. Death ensued from a complicating erysipelas. Autopsy revealed a large variety of lesions, among them, as of most interest, a solitary tubercle in the brain, tuberculosis of the thoracic duct and the peculiar rather characteristic picture of chronic miliary tuberculosis of the lungs. Both of the latter were literally studded throughout with miliary tubercles. Microscopically, practically all of them were of the productive type, with only rarely any evidence of an exudative process, and the nodules appeared to be of different ages, although most of them showed a more or less advanced fibrosis. As to the distribution of the foci, some were obviously of bronchogenic origin, but the majority were located immediately against the arteries of small size, and at times even projected into the lumen of the vessel, to occlude it and cause tuberculous endarteritis. Most of the infecting bacilli had been transported either by the lymphatic or by the blood stream, the fact of the latter path not being surprising considering the involvement of the thoracic duct and that the lymphogenic tubercles were penetrating the arteries. The interesting points brought out in the autopsy are the definite existence of a chronic miliary tuberculosis; that it corresponds in the X-ray picture and on lung section with the usual picture of miliary disease; that there was a surprising lack of tuberculosis of the organs other than the lungs; that the process is essentially an interstitial miliary tuberculosis and not a miliary alveolitis. The authors give as their hypothesis that chronic miliary tuberculosis is perhaps a disease of the lymphatic apparatus of the lung which invades the smaller lymphatic channels and the interstitial tissue by the retrograde route.—*Un cas de granulie chronique avec autopsie et examen histologique, R. Burnand, Ann. d. Méd., July, 1925, xviii, 46.*—*(W. B. S.)*

Healed Miliary Tuberculosis.—Theoretically and experimentally there is reason to anticipate, under favorable circumstances, arrest of an apparently overwhelming tuberculization. It is pointed out that the experimental studies of Gardner have proved the occurrence of resolution in pulmonary tuberculosis even after caseation has occurred, and it is argued that under certain circumstances the dosage of bacilli entering the blood may be divided, and a higher resistance to the successive crops of tubercles may determine the arrest of the process. Convincing demonstration of healed widespread tuberculosis was made by Opie and Andersen in 1920 at necropsies of adults dying from other causes than tuberculosis. The reported cases of healed miliary tuberculosis are reviewed and a new case is added. Radiograms in this case, a man of 31, showed

scattered calcified areas, 1 to 3 mm. in diameter, in both lungs, and the right costophrenic sulcus was almost obliterated by adhesions. The only doubtful feature was a past history of syphilis which had been treated. Since, however, the lung architecture between the deposits appeared normal, a fact which Blaine stresses as characteristic of healed miliary tuberculosis in contrast to gummata, when each nodule should have fibrous tissue radiating from it, and there was an obsolete costodiaphragmatic pleurisy, and the lesions were so numerous and minute, the diagnosis of healed miliary tuberculosis was reasonably sure. Moreover, calcification, though it may occur in gummata, is unusual.—*Healed Miliary Tuberculosis of the Lung, W. S. Middleton, Am. J. Roentgenol. & Rad. Therapy, September, 1925, xiv, 218.*—(*E. H. K.*)

Pathogenic Subtilis Bacillus in Tuberculosis.—During a tuberculous infection, the patient may be subject to secondary infections by parasites and saprophytes that may acquire virulence. *Bacillus subtilis* has been described a number of times as pathogenic for man, but always in connection with eye lesions. A case is reported which appears to be the second time that a subtilis bacillus, pathogenic for animals, has been isolated from human sources other than the eye. This bacillus was isolated from most of the lesions and the principal body fluids of a patient with acute and chronic tuberculous lesions in the lungs and other organs; at first it grew only on a medium containing blood, where it produced a large hemolytic zone, and it killed white rats. These results suggest that subtilis bacilli in cultures from human sources perhaps should not be discarded offhand as always being due to mere contamination.—*A Pathogenic Subtilis Bacillus from a Patient with Chronic Tuberculosis, H. C. Sweany and M. Pinner, J. Infect. Dis., October, 1925, xxxvii, 340.*—(*J. S. W.*)

Importance of Early Treatment in Pulmonary Tuberculosis.—Statistics have placed the charge upon the people of the United States for tuberculosis at between 300 million and 500 million dollars yearly. A high percentage of those who die are in the most useful period of life, between 18 and 36 years of age. Intelligent guidance and early treatment of the disease are sadly needed. While physicians may feel that the truth may be too shocking, the patient is apt to recover from the shock more rapidly than desirable. A frank talk will encourage confidence and instil hope. Too often the prospects of a long period of unemployment urge the tuberculous to keep on with the grind, the disease meanwhile progressing. A "lay-off" or vacation too often means a waste of time, and is merely temporizing. Patients who are merely sent to the country may do well, but they suffer from lack of supervision and instruction. The average man under such circumstances leads his life as he sees fit. It may appeal to his fancy to lounge in bed mornings, and a late breakfast will be the first breach of a good dietetic regimen. He may later in the day decide to take a walk, and if in mountainous country may return fatigued and too tired for supper. If it is winter, his outdoor life will be limited, and he will probably spend the evening indoors or perhaps at a roadhouse, eating and dancing. Thus he will lead an irregular life with very little fresh air and insufficient rest, the essentials of treatment being neglected. As for ambulant treatment, it is true that we occasionally see a patient apparently getting along well without quitting work entirely, but such cases are usually of the chronic fibroid type. Such therapeutics will not do for the early case. Too many advanced cases now enter our institutions. At Rutland State Sanatorium the number of minimal cases admitted is only 20 per cent. Of all hospitalized patients with tuberculosis only 3 per cent survive the fifteenth year after leaving the sanatorium. Only 30 per cent of minimal cases had positive sputum. To wait then for the appearance of a positive sputum, to prescribe a vacation or a rest in the country, all spell delay. The sanatorium is the first, not the last place to which we should send our patients, and the case should be definitely stated when diagnosed and adequate instructions given.—*The Importance of Early Treatment in Pulmonary Tuberculosis, M. H. Joress, Boston M. & S. J., September 3, 1925, cxciii, 471.*—(*A. P.*)

Montana, Switzerland, as Health Resort.—It is attempted to provide English medical advisers with information and practical suggestions regarding sanatorium conditions in Switzerland, and in a form which the doctor, if he thinks advisable, may pass on to his patient. A description is given of the Palace Sanatorium, Montana, which is readily accessible to English visitors and can be reached in about 22 hours from London. The altitude is 5,000 feet, and the air is dry, with a comparatively low rainfall. The average daily sunshine for the six months of winter is 5.28 hours, compared with 1.35 hours at Westminster, London. The dryness, rarity, purity, and stillness of the air lessen the tendency to develop catarrhal states. Leonard Hill carried out investiga-

tions at Montana, and found that the basal metabolism is increased from 40 to 100 per cent in patients living under open-air conditions. Patients in whom the lesion is limited, nonprogressive, and the reparative powers are good, do well. The contraindications are less numerous than was formerly believed. Cases of hemoptoic onset often do uncommonly well, as also do the very young and the very old. Elderly subjects, especially men with evidences of cardiovascular degeneration with thickened arteries and high blood pressure, who are the subjects of long-standing pulmonary fibrosis, are unsuitable for a high altitude. Cases showing evidences of hyperthyroidism, valvular disease of the heart, chronic renal disease, mental instability and nervous affections, commonly prove unsatisfactory subjects for all mountain resorts. Most patients with simple surgical tuberculosis react to properly applied heliotherapy. Cases that have been the subjects of artificial pneumothorax often do admirably at a mountain sanatorium.—*Montana as a Swiss Health Station for English Tuberculous Patients, T. N. Kelynack and A. Morland, Brit. J. Tuberc., October, 1925, xix, 163.*—*(J. C. D.)*

Tuberculosis and Physical Agents.—*I. Air:* The air in the larger centres varies in bacteriological content from 500 to 70,000 bacteria per cubic metre. In the country the count is very low. It diminishes with altitude, and on the sea with the distance from shore, being zero on midocean. Requisite conditions for the open air cure are (1) relative dryness of the air, (2) sufficient permeability of the sun, (3) shelter from winds and (4) plenty of light. *A. Marine climates:* These possess (1) constant humidity, (2) well-marked ventilation, (3) great luminosity with predominance of the ultraviolet rays, (4) stability of barometric pressure and of temperature, and (5) traces of sodium chloride, iodine and ozone. The marine climate is a stimulating one. Hematosis and hematopoiesis are favored. It is indicated for the debilitated, the anemic, those convalescent from infectious diseases, and especially the pretuberculous and those with surgical tuberculous affections. It is generally condemned in pulmonary tuberculosis, but there are exceptions. Modified marine or litoral climates, such as that of the Côte d'Azur, possess greater dryness and warmth combined with similar luminosity, and are tonic and stimulating. Here the humidity abruptly increases at sundown as the temperature decreases. Kuss regards this climate as beneficial for those subject to bronchitis, and for the emphysematous, rheumatic, anemic and lymphatic. It is not suitable for those with active febrile disease or an excitable nervous system. *B. Climate of the plains:* This is above all sedative. The frequent nocturnal rains are quickly absorbed by the permeable soil. Patients sleep well. *C. High altitudes:* These climates are stimulating and exciting, especially in winter, when the ground is covered with snow. The cold is better borne than on the plains because of the relatively dry atmosphere and absence of wind. The luminosity is more intense. The pretuberculous and young apyretic patients do well in these climates, as well as many with torpid chronic lesions. Very frail and delicate subjects, however, and the profoundly cachectic or anemic should not be sent to high altitudes. Nervous excitability and the presence of well-marked cardiovascular disturbances are also contraindications, and very active febrile exacerbations. Patients with tuberculous laryngitis may not tolerate high altitudes well. As for hemoptoic forms, opinion is divided. In general, mountain climates should be prescribed for those who need a "crack of the whip." Pneumothorax patients readily adapt themselves to changes in altitude, except long-standing cases. *II. Light:* The hypothesis is put forward that a ray of light falling on a naked body is partly reflected, part penetrates the skin and transmits its movement to underlying molecules and atoms, and part penetrates the internal organs and possibly passes through the entire body. The red rays are tonic and stimulant, and produce vasodilatation and passive congestion. The orange, yellow and green rays appear to stimulate hemoglobin and erythrocyte formation. The blue and violet rays are microbicidal and promote oxidation. Heliotherapy finds its chief application in surgical affections and lymphatic tuberculosis. It is contraindicated in the pulmonary forms excepting the earliest stages. *III. Water:* Hydrotherapy is employed at Leysin and Davos and the marine sanatoria. Cold water is a peripheral nerve stimulant and excites vasoconstriction and increased heart action. The later effects may be sedative. Hydrotherapy is especially beneficial in the pretuberculous, asthenic and nervous. Cold sponges may be taken on arising from the heat of the bed, followed by brisk friction. Wet packs often lower the temperature of febrile patients and improve their appetite and digestion. They may also be applied to the chest for pleurisy or painful cough or congestive attacks. Douches are useful as brisk stimulants, followed by friction.—*Tuberculose et agents physiques, Van Cauterin, Rev. Belge d. l. Tuberc., March, 1925, no. 3, 70.*—*(A. P.)*

New Lung Splint.—This consists of an aluminum shoulder piece, covered with rubber and lined by a rubber pneumatic bag which can be inflated to any desired pressure. It exerts an inward pressure in all directions, the power being derived from its own rigidity and by anchoring it to the opposite shoulder and thigh, and in this manner it does not interfere in any way with the movements of the opposite lung. The splint and accessories weigh about 1 to 1½ pounds. It does control apical movement, and early results of its use are apparently encouraging. It is naturally uncomfortable at first, but if it is carefully adjusted, and if only a slight pneumatic pressure is used for the first few days and gradually increased, patients will wear it without any discomfort during the whole twenty-four hours.—*A Lung Splint, R. C. Wingfield, Lancet, January 2, 1926, ccx, 17.*—(*J. C. D.*)

Postural Rest in Treatment of Pulmonary Tuberculosis.—Emphasis is laid on the specificity of rest in bringing about a cure of even the most active tuberculous lesions, and on the importance of making this rest sufficient both in quality and duration. Attention is called to the advantages of postural rest, and in cases of bilateral apical disease, of the application of shot-bags. The absorption of massive exudative tuberculous lesions, as a result of prolonged rest, is demonstrated by a number of cases with roentgenograms. In general, the deposits began to clear after six months of rest, but have not been completely absorbed until from two or three years of rest. In some cases, with the absorption of lesions, complete disappearance of râles is noted. In others, râles remain or are inconstant, possibly owing to bronchiolectasis. Rest should be prolonged many months after the temperature and pulse have become normal and sputum has disappeared.—*Pulmonary Tuberculosis; Prolonged Rest and the Absorption of Deposits, G. B. Webb, J. Am. M. Ass., September 19, 1925, lxxxv, 867.*—(*E. H. K.*)

Exercise in Treatment of Tuberculosis.—Bodily exercise can be advised only in certain forms of tuberculosis, such as that of the bronchial lymph nodes or in incipient and mild cases. It can also be used in fibrotic tuberculosis and cases of generalized lymph-node, bone and skin tuberculosis. If the disease has become inactive the more vigorous exercises may be recommended, such as jumping, running, throwing, and moderate swimming. More vigorous exercises are also of value in arrested tuberculosis. Children are better suited for the more vigorous exercises. Actually entering into sport is warned against, since fatigue and overexertion are harmful.—*Über die Verwandbarkeit von Leibesübungen in der Tuberkulosebehandlung, G. Simon, Ztschr. f. Tuberk., 1924, xl, 266.*—(*H. J. C.*)

Diet in Pulmonary Tuberculosis.—There is no universally applicable diet in pulmonary tuberculosis. The clinical condition varies enormously, and the appropriate diet is correspondingly different. When there are no complications or toxemia an ordinary diet is indicated. The open-air life and undernutrition necessitate an increase in ration of all the chief foodstuffs and a relative increase in the ration of fatty foodstuffs. No special kinds of foods are called for, nor unusual quantities of milk or eggs or any other article. When there is toxemia without other complications we have to provide a full diet in a form which will impose but little work on the enfeebled digestive organs. Milk does not contain the best proportions of foodstuffs for an adult patient, and needs supplementing by additional quantities of carbohydrates. A well-made milk pudding is a far more suitable food for the adult patient than plain milk. To increase the value of fever diet in tuberculosis the use of the proprietary foods is justified. Reflex vomiting caused by cough, and not dependent on gastric disability, is best treated by giving a supplementary meal soon after. In intestinal tuberculosis the diet should consist of articles leaving but little indigestible residue, so that green vegetables must be cut down and replaced by more digestible things with similar properties. In hemoptysis it is important to avoid a low diet. There is no advantage in cold foods and iced drinks. Soft food is advisable, but a pure milk diet increases constipation and should be avoided. There is an advantage in limiting the amount of fluid to 15 ounces per day, in which cases small pieces of ice to suck may relieve thirst. In pulmonary tuberculosis the diet is not determined by the label given to the disease, but the clinical features, and in many cases need not depart widely from that in health.—*Diet in Pulmonary Tuberculosis, F. R. Walters, Tubercle, March, 1925, vi, 277.*—(*B. T. McM.*)

Dietetic Treatment of Tuberculosis.—That diet is important in tuberculosis was emphasized by the "hunger experiment" of the world war during which death-rates from this disease doubled. Foods rich in fats and proteins are better for the tuberculous. Animals maintained on protein, others on fats and still others on carbohydrates, and subsequently infected with

tubercle bacilli, ran courses that differed in that the protein-fed animals developed very slight tuberculosis, the fat-fed ones a little more, and those fed with carbohydrates had very extensive disease. Protein food spares the body tissues; fat may aid in a specific addition to the lipin content of the bacillus as well as by giving calories, vitamines, etc. Although it would not be wise to remove carbohydrates completely from the diet of the tuberculous, the bulk of the calories had better be provided in the form of fats. Alcohol in the form of beer is probably helpful, at least in so far as it adds to the weight and stimulates the appetite. It is suggested that the fats may aid in the calcification of tuberculous foci, as codliver oil does in rickets.—*Die diatetische Behandlung der Tuberkulose, M. Weiss, Wien. klin. Wchnschr., October 8, 1925, xxxviii, 1114.—(H. S. W.)*

Results of Sanatorium Treatment.—A study of the mortality among sanatorium ex-patients gives a good impression of the expectation of life enjoyed by patients when they leave the sanatorium. There are three studies of the mortality among sanatorium patients, each of them of much interest, but additionally valuable collectively, inasmuch as, though made independently and dealing with different patients treated in different institutions, the results show a striking similarity. This agreement is presumptive evidence of their accuracy. In 1913 Elderton and Perry published the mortality of 3,000 cases treated at the Adirondack Sanatorium during the years 1885–1911. The author made a similar investigation among 1,700 patients discharged from King Edward VII Sanatorium from 1907 to 1914. Recently a study on precisely similar lines was made of the after-histories of 3,738 patients discharged from the Brompton Hospital Sanatorium at Frimley during the years 1905–1914. Speaking broadly, the experience of these three sanatoria is that among "early" cases of pulmonary tuberculosis the mortality is six times that of the general population. Among "moderately advanced" cases it is 10 times heavier, and among "advanced" cases, 36 times that of the general population. The author's analysis of some 10,000 cases treated by the public health authorities in London indicated that, of a number of "early" cases, some 75 per cent will be found to be alive five or six years after leaving a sanatorium, and that of a number of "moderately advanced" cases some 50 per cent will be alive after a like period. The remainder, in both instances, will have died. It may be added that, having safely come through five years, the patient's prospects are appreciably better. Of a number of sputum-negative cases, after-history returns show permanent recovery in 80 per cent or more. The sanatorium is the means of alleviating the lot of many patients and of returning a large number to a long life of usefulness. If we think of pulmonary tuberculosis as one of the most difficult of the curable diseases to cure, this record is no small achievement. For the time being, sanatorium treatment and the various surgical methods now employed in association with it offer the best hope to the tuberculous patient. And this hope is far from the forlorn character of that offered to patients in the days before the sanatorium was introduced.—*The Results of Sanatorium Treatment, N. D. Bardswell, Tubercle, February, 1925, vi, 220.*—(*B. T. McM.*)

Sanatorium Treatment of Juvenile Tuberculosis.—We are confronted with the very definite need for the establishment of a policy of treatment for juvenile tuberculosis. Preventorium work, observation and care of tuberculosis contact, treatment of undernourished children, and other like procedures are far better carried out in preventoria, open-air schools, nutritional clinics and the like than in sanatoria. Children's sanatoria should admit and care for children with active tuberculosis exclusively, although not all active tuberculosis in children necessarily requires sanatorium care. The following are the chief advantages of sanatorium treatment: (1) Possibility of accurate classification, (2) combination of individual treatment and group management, (3) coördination of treatment with continued education, (4) therapeutic discipline, (5) application of special methods, such as pneumothorax, X-rays and heliotherapy, and (6) adjustment of the dietary to meet individual needs. All types of active tuberculosis of childhood may be treated in sanatoria, and the fresh-air regimen is early imposed and maintained without difficulty. Nutritional experiments are generally out of place in sanatoria, which should strive for a tasty, wholesome, well-balanced menu. Rest must be most carefully regulated, as it is far easier to prescribe rest for a child than to see that it is carried out. There must be an inflexible rest routine, but for the improving and favorable cases properly regulated exercise is equally important, also suitable recreation, including games of a nonfatiguing type. When strict rest is required, rest in bed with the patient lying on the affected side will reduce the respiratory excursion of that side, and postural drainage will be of advantage when sputum is copious

or difficult to raise. Artificial or localized rest by means of artificial pneumothorax should be borne in mind for the rather unusual cases of progressive and active disease in one lung in children. Further surgical treatment by thoracoplastic collapse remains a possibility when the former is not feasible. Bone and joint tuberculosis also requires most careful rest. Rollier is as insistent about the absolute rest of his actively diseased orthopedic patients as he is about heliotherapy for them. Heliotherapy for ten years has been included as a part of the routine for all cases of bone or lymphatic tuberculosis admitted to the Connecticut State sanatoria. Skin and peritoneal tuberculosis, and selected pulmonary cases also receive this treatment. It is first necessary to test the patient's tolerance by beginning with a brief exposure of the feet. The exposures are increased in extent and duration gradually until the patient can withstand two hours daily exposure of the whole body. Then, during the entire day, except in winter, the child is clothed only in short trunks. During the winter ordinary clothes are worn except during the two-hour sun-cure, when trunks, shoes, gloves and hat constitute the costume. Treatment is not discontinued on dull days, as much of the ultraviolet radiation comes from the sky rather than directly from the sun. Satisfactory response is seen in practically all except pulmonary cases; here the true juvenile type without parenchymatous involvement does well, but the child with manifest active lung disease must be placed on the treatment most cautiously, as reactivation or exacerbation following carelessly regulated doses is not uncommon. The routine followed at the Meriden Sanatorium is as follows: All new patients are admitted to the Reception Ward for three weeks' observation. Here they are introduced to the open-air and sun-cure and all necessary examinations and tests are carried out. The next step is the infirmary, where are domiciled cases with progressive disease, those requiring much orthopedic attention and those that require special individual treatment of any kind. As the patients improve and their disease becomes less active, they are transferred to convalescent wards, where sun-cure is less restricted and only casual symptomatic treatment required. When all manifestations of constitutional toxemia have remained absent several months or longer, the child is discharged. The average stay is about eleven months. Tanning is considered essential to the success of heliotherapy, and may be aided by painting the skin with a weak solution of tincture of iodine or by administering tincture of the chloride of iron. Most cases of tuberculous adenitis will respond well to heliotherapy, but for a small percentage surgery in competent hands is applicable. Simple aspiration of suppurating lymph nodes is occasionally necessary, but the injection of chemical agents has not been found of any advantage.—*The Sanatorium Treatment of Juvenile Tuberculosis, C. B. Gibson, Boston M. & S. J., September 3, 1925, cxciii, 457.*—(*A. P.*)

Duration of Sanatorium Treatment.—Sanatorium physicians and tuberculosis officers are expected to be able to give some kind of authoritative reply on purely medical grounds as to the duration of sanatorium treatment. There were just over 13,000 sanatorium beds in England for the treatment of tuberculosis in 1923. These have to serve roughly 65,000 notified cases. It is quite clear that the available accommodation must be economically utilized if adequate treatment for suitable cases is to be given. One may say that temperamental, financial and social considerations must modify any purely medical dogma as to the ideal duration of the treatment, but as a basis for discussion it is suggested that "sputum-negative" cases without marked toxemia or physical signs should have three months' treatment. If physical signs are well marked they should be given as long a treatment as "sputum-positive" cases. The early "sputum-positive" case requires six to seven months, and the intermediate case must be judged entirely on the progress; any permanent increase in physical signs, even if the general health is better, should be an indication for a change of treatment, but a progressive improvement in physical signs should justify anything up to twelve months, or even longer, if the home conditions are likely to be reasonably good on return. For advanced cases, no sanatorium treatment should be given, but open-air hospital treatment, where attention is given to education concerning infection.—*The Duration of Sanatorium Treatment, W. C. Fowler, Tubercle, February, 1925, vi, 216.*—(*B. T. McM.*)

Disappearance of Elastic Fibres from Sputum during Sanatorium Treatment at High Altitude.—The disappearance of elastic fibres in the sputum as an index of the abeyance of the destructive process in the lungs is of significance. In the Turban Sanatorium at Davos elastic fibres are sought for in fresh preparations by the following method: The morning sputum is expectorated into a black glass in which it is divided into small particles by means of

platinum needles and the pale nummular flakes are easily seen on a black background. The suspected material is placed upon a slide covered with a cover-glass, and is examined under low power without a condenser. The findings are then verified under higher power in which the fine elastic fibrils can be seen. As a result of studies with this method it was found in the sanatoria at a high altitude, with and without specific therapy, that one-half of the patients who entered with elastic fibres in the sputum lost them with clinical improvement, and a quarter coincidently became free from tubercle bacilli.—*Über das Verschwinden der elastischen Fasern im tuberkulösen Sputum bei Anstaltsbehandlung im Hochgebirge, W. Viets, Ztschr. f. Tuberk., 1924, xl, 416.*—(*H. J. C.*)

Sea Voyages in Treatment of Tuberculosis of Infants.—The curative action of marine climates is greater on the sea than along the shore, because there is less variation in temperature and barometric pressure, humidity is absent, and high winds in the morning and evening are less frequent. Ideal conditions are offered for rest, and in addition there is the benefit to be obtained from exposure to the sun and pure air. The high mortality from tuberculosis among sailors, which some authors use as a basis for denying the beneficial effects of marine climate, is explained by the widespread unhygienic conditions of life among this class. A case is cited of a nine-months-old infant with mediastinal tuberculosis who was very greatly improved by a cure at sea.—*L'action de la thalassothérapie sous forme de croisières maritimes sur la tuberculose infantile, P. Nicolesco, Congrès Internationale de Thalassothérapie, April 27–30, 1925, reported in Presse Méd., May 13, 1925, no. 38, 630.*—(*E. H. K.*)

Morland Clinics at Alton.—While abundant provision exists for the children of the working class, suffering from surgical tuberculosis, until the establishment of the Morland Clinics no comparable institutions were available for the better classes in England, the result being that they were almost compelled to seek assistance in Continental clinics. The disadvantages of this are too evident to need emphasis. Morland Hall is situated in a part of the country where the mildness of the climate makes outdoor treatment possible during the greater part of the year without discomfort to the patients. Specially designed solaria have been constructed, giving ample accommodation for natural sun treatment, and provided with shelters or sliding roofs as a protection against rain. A balustraded terrace is reserved for the use of children. There are rooms for operative treatment, physiotherapy, radiography and radiotherapy, massage, plaster application, and other methods of treatment. The two light departments are equipped with tungsten-arc and mercury-vapor lamps. A Finsen-Reyn lamp with full range of water-cooled quartz compressors is installed for the local treatment of lupus. There are the fullest facilities for the general light baths and intensive local light treatment, the varying apparatus permitting the employment of ultraviolet light, radiant heat and light of varying wavelengths, combined or separately. A specially designed portable triple-arc lamp has been installed, enabling patients to obtain general or local light baths of desired wave length and intensity in their own beds. Special provision is made for patients suffering from all forms of nonpulmonary tuberculosis. Other cases accepted include various forms of arthritis, anemia, neuritis, convalescents from operations and severe illness, and other conditions requiring lengthy and careful treatment. Patients with active pulmonary tuberculosis are not admitted. Patients of any age and either sex are eligible but special attention is paid to the needs of children. The education of the latter is not neglected.—*The Morland Clinics at Alton, H. Gauvain, Brit. J. Tuberc., October, 1925, xix, 200.*—(*J. C. D.*)

Effect of Sunlight on Growth and Development.—Chickens allowed to run outdoors or exposed to emanations from the mercury-vapor quartz lamp, grew and developed normally, while others on practically the same diet, but kept constantly under window-glass, remained stunted, weak and sickly, and X-rays of their bones showed them deficient in calcium. It is the narrow band of sunlight between 0.31 and 0.29 micra in wave-length that is not transmitted by window glass and is responsible for this difference in growth and development.—*The Effect of Sunlight on Growth and Development, W. T. Bovie, Med. J. & Rec., October 21, 1925, cxxii, 450.*—(*E. H. K.*)

Therapeutic Value of Light.—*I. W. E. Dixon:* There is good evidence for believing that light, mustard leaves and mustard gas ultimately produce their effect in the same way, namely, by stimulation of the sensory nerves of the skin, which reflexly causes vasodilatation. The mechanism of stimulation of the nerve-endings by light, and the variation of individuals in susceptibility towards these rays may be explained by the rendering of the body supersensitive to

light by the presence in the system of a fluorescent substance, for it is known that certain fluorescent substances may give rise to light sensitiveness. It is argued that quinidine, a fluorescent substance isolated by Bence-Jones from the tissues and urine of normal subjects, may be the factor which by varying in different skins accounts for the varying susceptibility of individuals to light. The general systemic action of light stimulation produces slight stimulation of the heart, slight splanchnic vasoconstriction, and some increase in respiration. Metabolism is slightly increased; the absorption of oxygen, carbonic acid output, and nitrogenous excretion, are all augmented. The specific effect of light is in its influence on the storage of calcium and phosphorus and their equilibrium, not only in growing, but in mature animals. Care must be used in ultraviolet therapy, because there is clinical evidence that overdose leads to diminished immunity. *2. C. E. M. Jones:* The two conditions in which light treatment has been found to be of the most value are rickets and nonpulmonary tuberculosis, and in the latter light should be considered merely as an adjuvant to the other methods of treatment. Locally, natural sunlight has direct bactericidal action, and also acts by producing an inflammatory response in the exposed region. The general effects are a feeling of well-being and exhilaration combined with increased metabolic activity. The benefit which a patient derives from sun treatment appears to be associated with his power of pigmentation. Those who do not pigment may become depressed and do poorly. Patients receiving sun treatment are relatively free from the muscular wasting commonly associated with bone and joint tuberculosis. General light baths may be given artificially, either by means of the carbon-arc lamp or the mercury-vapor quartz lamp. The former may be employed with caution in the treatment of cases of the nonpigmenting type which cannot be exposed to natural sunlight. Cases of lupus, scrofuloderma, skin tuberculides, lymph nodes of the neck, and sinuses are greatly benefited by local treatment by light relatively rich in ultraviolet rays, as that from the quartz lamp, rather than sunshine. Light treatment is contraindicated in nonpigmenting persons, in pyrexial cases, marked amyloid disease, the acutely ill, the very young and the aged. *3. G. H. Lancashire:* Artificial sunlight treatment in dermatology has been reserved for tuberculosis skin cases, mostly lupus vulgaris. The whole body receives irradiation, the lesions themselves in most cases being covered. Results have been good and may be even better when local is combined with general treatment.—*Discussion of the Therapeutic Value of Light, Proceedings of Sections at the Annual Meeting, 1925, British Medical Association: Section of Therapeutics, Brit. M. J., September 19, 1925, no. 3377, 499.—(E. H. K.)*

Principles of Artificial Heliotherapy.—*General considerations:* Finsen originated the local light therapy of lupus. He utilized both natural and artificial sources of light, for instance, carbon-arc lamps, and by means of large rock-salt and quartz prisms concentrated very intense light upon the diseased areas. The mode of action of the sun's rays on the animal body is still an unsolved problem, although it is known that radiant energy is transmitted in the form of wave motion through a hypothetical "ether." The direction of the wave is transverse, and the velocity slightly over 186,000 miles per second. Wave-lengths are expressed in terms of Ångstrom units, one of which corresponds to $\frac{1}{10{,}000{,}000}$ of a millimetre. The short ultraviolet rays have wave-lengths around 2,000 and the longest infrared 12,000, the visible spectrum lying between 3,900 and 7,700. Beyond the ultraviolet are the radium and X-ray waves, and beyond the infrared the Hertzian, with lengths of 5,000,000. *Physical and biologic reactions:* Clark Maxwell has described light as an electromagnetic disturbance propagated with great velocity. Absorption of radiations by the atoms liberates negative electrons and gives rise to specific photoelectric reactions. The biological reactions to light vary considerably with the nature of the wave-length. The three principal groups of rays are: (1) heat rays, (2) luminous rays and (3) ultraviolet rays. The heat rays consist of radiations between 12,000 and 7,700 Ångstrom units. The rate of all chemical reactions is accelerated by heat. All bactericidal effects produced by heat are due to coagulation of protein. There is no prolonged latent period between the time of irradiation and the resulting reaction. The skin pigment, melanin, absorbs heat rays, and a mottled macular erythema may result from prolonged exposure. The luminous rays are a series of radiations between 7,700 and 3,900 units. Luminous rays have slight photochemical powers, chiefly toward the violet end of the spectrum. Certain metals exhibit a selective photoelectric effect, potassium with blue, sodium and rubidium with yellow. Irradiation of the skin with pure luminous rays, if heating is avoided, cannot produce erythema or its sequellae. When tissues are combined with substances like erythrosin and eosin, known photo-

sensitizers, bactericidal activity can be demonstrated with luminous rays. Luminous rays penetrate the skin further than the infrared, and may heat tissues 3° to 4°C. above skin temperature at 4 to 5 mm. depth. Ultraviolet rays have marked photochemical photoelectrical and photoabiotic properties. Metals irradiated *in vacuo* develop a positive charge and liberate negative electrons. Ultraviolet rays are extremely lethal to many organisms, but penetrate less and less with decrease in wave-length. Skin irradiated with ultraviolet rays demonstrates marked fluorescence. Irradiated media exhibit changes in H-ion concentration. Death occurs by molecular structural change and aggregation. Ultraviolet rays destroy toxin and antitoxin and most enzymes. The rays are powerfully absorbed by blood and protein tissues. Ultraviolet rays are detected by (1) spectroscope and photographic plate, (2) many electrical methods, especially photoelectrical cells, (3) lethal action on bacteria, and (4) chemical methods, such as changes in a solution of acetone methylene blue. There is a latent period before the development of erythema, and it is circumscribed to the radiated area. It is barely conceivable that the ultraviolet rays penetrate to the most superficial capillary plexuses of the skin. Ultraviolet rays may be filtered off by glass or quinine filters. Heat or luminous rays activate and accelerate the biological action of the ultraviolet rays. When skin is exposed the ultraviolet rays start a chemical change in the epithelial cells which is carried further by heat and luminous rays. The Finsen-Reyn lamp is a carbon arc utilizing a current of 20 amperes and 50 volts, and concentrates a beam of intense light, which is focussed through a series of quartz lenses and on to a quartz applicator, which is water-cooled. The lamp emits intense heat and luminous rays, but the ultraviolet rays are weak, partly due to poor focussing. Investigations of lupus skin irradiated with Finsen light showed vascular dilation, hyperemia, leucocytic infiltration and nuclear necrobiosis. Heat rays increase the bactericidal power of the blood if sufficient to cause counterirritation and thermic reaction. Luminous rays have no such effect. Ultraviolet rays have a marked effect, as do also mustard poultices when applied for a half-hour to the shaved skin of rabbits. The counterirritant effects of the erythema, therefore, seem to be important. Clinically, both sun-baths and exposure to artificial sources of light have given excellent results in many chronic diseases. The rôle of pigmentation is disputed. Rollier and Christen maintain that the pigment acts as an optical sensitizer, absorbing luminous rays and transmitting shorter ones. This lacks conclusive proof. Reyn aims to produce erythema, and is able to give much larger doses after pigmentation; nevertheless, many who pigment slowly or not at all obtain benefit. The pigmentation from sun-exposure is a dark brown-black, and the Finsen arc gives rise to a similar color. The long white flame and tungsten-arcs give a reddish-brown color, and the mercury-vapor lamp a pale yellow-brown. Excessive doses, causing violent erythema, may damage and lower the hemobactericidal power. With fever patients, if a source of light rich in heat and luminous rays is employed, marked pyrexia, rigors and malaise may occur. For such the cool early morning sun or mercury-vapor lamp is to be preferred. The effect of radiation on the bactericidal power of the blood in chronic infections is difficult to determine, because the index is normally fairly high in these; in acute infections, when the index is lowered to 30 or 40 per cent, investigations are under way. *Types of lamps and clinical application:* The two principal types of lamps utilized are the carbon-arc and mercury-vapor lamps. The radiation emitted from a lamp depends greatly upon the amperage and voltage between the electrodes and the nature of the electrodes. A source of ultraviolet light may be tested in three ways: (1) the time taken to kill infusoria enclosed in a quartz water-cooled chamber; (2) the time required to bleach a standard solution of acetone methylene blue; and (3) the action of the normal white skin to the source of light. Twice the time required to kill infusoria will produce a mild erythema. Different areas of the body vary in sensitiveness to light. The inner side of the arms and thighs and the popliteal spaces are most sensitive. Small areas of abdominal skin may be given preliminary test exposures. Dark skins require longer doses than fair ones. And some very sallow ones show very little erythema at first. The quality of the erythema may be estimated with the Lovibond tintometer. The treatment should be controlled by the erythema produced, and guided by the clinical signs and symptoms. Early desquamating skin is very opaque to ultraviolet rays, while the new skin is very sensitive. For low-amperage arcs (5 to 10 amperes) tungsten is useful. In higher-amperage arcs the length of the flame is controlled by the voltage. The Copenhagen arc, a short-flame type, has a current of 75 amperes, 40 to 50 volts. The long flame arcs work at 30 to 35 amperes and 65 to 80 volts. White-flame carbons are more economical than tungsten, and give as much energy. There are two types of mercury-vapor lamps: (1) the vacuum type and

(2) the atmospheric type. The former loses power as the vacuum becomes reduced with use, while the latter does not deteriorate. The chronic inflammatory diseases are most amenable to treatment, especially lupus, psoriasis and staphylococcus infections. Localized tuberculosis also responds gradually. In the early stages, open lesions, ulcers, sinuses, etc., are best covered to avoid severe reactions. Nonpigmenters require very cautious dosage. When the circulation to the site of the lesions is very poor progress is apt to be slow. Hence early treatment is as important with this as with other agents.—*Observations on Some of the Principles of Artificial Sun Treatment, A. Eidinow, Brit. J. Tuberc., July, 1925, xix, 113.—(A. P.)*

Influence of Sunlight and Artificial Light on Health.—*1. Leonard Hill:* Of the ultraviolet rays, covering a range from 400 to 180 millimicra, those longer than 330 millimicra penetrate to the blood, and are absorbed with the visible rays and converted to heat; the middle ultraviolet rays penetrate to the deeper living cells of the epidermis, the shorter only to the more superficial living cells, while the shortest are stopped by the horny layer of epidermis. Rays of 297 millimicra give a maximal erythema effect. The shorter ultraviolet rays kill bacteria, but tubercle bacilli are resistant. According to Gauvain, however, radiation of excised bits of lupus skin compressed between quartz may kill the bacteria within them. The infrared rays have no bactericidal action other than that due to heat. With the first degree of erythema produced by the sun or an arc lamp there results *in vitro* an increased hemobactericidal power of the blood for an hour or two. In acute diseases, such as active, febrile tuberculosis, however, great caution must be used in exposing the skin to ultraviolet rays and the heating effect of visible rays. Reaction from damage to the skin may reduce immunity in such cases. Short exposures to the long flame carbon-arc, rich in ultraviolet rays, would benefit city dwellers in the winter time by preventing rickets, tuberculosis, rheumatic fever, skin diseases, etc. During this time, owing to mist, cloud, glass windows and smoke, these people receive almost no ultraviolet rays. Melanin, not a sensitizer, but a screen protecting the deeper epidermic cells and blood, and apparently a derivative of tyrosin and such-like amino acids, converts the visible into heat-rays and warms the epidermis. The nerves therein are thus excited, and dilatation of the cutaneous vessels provoked. People who pigment well appear to be cured by light treatment more easily than red-haired or thin-skinned people who freckle. Cool open air and sun are good, hot midday sun bad, for the treatment of surgical tuberculosis. Chronic phthisis cases must be protected from heat and given exposure to cool morning sun or arc-lamps in cool places. The lamp of choice and the dosage to be given are matters of dispute. The mercury-vapor, the "white-flame" carbon arc, the tungsten arc or the tungsten filament incandescent lamp with quartz globe, each has its advocates. Some believe in doses which produce mild erythema; others avoid erythema. Some think pigmentation hastens curative effect; others think it screens off the radiation and should be avoided. Dosage can be measured by the degree of fading in a given time of a 30 per cent solution of acetone methylene blue put in a standard quartz tube and placed at the same distance from the patient as the lamp. Varied and unstandardized as are the present methods of treatment, all claim equally good curative effects. *2. G. B. Dixon:* Treatment by artificial light in connection with tuberculosis has been given by exposing the whole body gradually to the light form short-flame carbon arc lamps, consuming 75 amperes. The spectrum of this light is said to approach more nearly that of sunlight than does that of the mercury-vapor or tungsten-arc lamp. Pigmentation, while generally a guide to progress and prognosis, is not always so. Certain nonpigmenters improve slowly, but require more than usual care in treatment. Among conditions benefited by light baths are lupus vulgaris, cervical adenitis, mediastinal tuberculosis, bone and joint tuberculosis, and tuberculous laryngitis. Muscular tone is improved, particularly in bone and joint tuberculosis. Sequeira reports cures in 70 per cent of lupus cases, and Strandberg in 50 per cent of cases of tuberculous laryngitis. Rollier says that heliotherapy should be a useful factor in the treatment of the great majority of cases of pulmonary tuberculosis, if properly applied. *3. Dora C. Colebrook:* Light therapy, using a long-flame carbon-arc lamp, has been found of value in an infant welfare centre in treating (1) nursing mothers whose breast milk is failing, or whose baby, though breast-fed is not thriving; (2) babies of any age and toddlers up to 2 years who are temporary residents on the wards; (3) babies and children up to 5 years attending the centre from their own homes. Rickets, various types of malnutrition, anorexia, sleeplessness, colds and coughs are benefited in varying degree.—*Proceedings Annual Meeting, 1925, British Medical Association: Section on Public Medicine, Discussion on Influence of Sunlight and Artificial Light*

on Health, Brit. M. J., September 12, 1925, no. 3376, 470.—(E. H. K.)

Heliotherapy and Actinotherapy in Surgical Tuberculosis.—Here special provision is now made for treating surgical tuberculosis in children. A first class operating theatre and accessories are included; also X-ray installation, plaster room, etc. The hospital ward of 30 beds opens on a gallery facing south, sheltered from the other directions, and facing across the Sussex Weald to the Downs. For a large part of the year the children sleep out, and the duration of sunshine is as great as in any part of England, though generally insufficient except in summer. On the west side of the open-air gallery is a room fitted for artificial-light therapy during sunless weather. The apparatus consists of a mercury-vapor lamp and a long-ray lamp specially designed, and able to be clamped to any part of the cot. A wound can thus receive open-air exposure and at the same time be kept warm, no dressings being applied, although discharging sinuses are swabbed clean at intervals. Ulcers and sinuses have responded very satisfactorily.—*Heliotherapy and Actinotherapy at the Heritage Craft Schools, Chailey, G. M. Levick, Brit. J. Tuberc., July, 1925, xix, 144.—(A. P.)*

Artificial Light Baths.—The value of sunlight in certain forms of tuberculosis and of rickets is established. It is also recognized that artificial light can be utilized to replace and supplement the sun's rays. It has been determined that the various parts of the visible and nonvisible spectrum have different therapeutic activities, and in time it is hoped to be able to state definitely what portion of the spectrum is responsible for the clinical phenomena observed. Experiment has shown: *1.* That infusoria can be immobilized by exposure to a mercury-vapor lamp, but that the time required is lengthened by exposure to red rays. *2.* That rats fed on a diet deficient in vitamin-A cease to grow normally in from seven to ten days. If rats so fed are subjected for ten minutes every second day to the radiations of a mercury-vapor lamp, the growth of the animals is normal for from 35 to 50 days. After that, symptoms of vitamin-A deficiency occur and xerophthalmia develops. *3.* The development of rickets is prevented in rats fed on a rickets-producing diet by a daily exposure for fifteen minutes to a mercury-vapor lamp. *4.* That the bactericidal power of rabbit's blood against staphylococcus can be greatly increased temporarily by exposing the shaved skin of the animal to the mercury-vapor lamp. This power may be diminished in certain cases in man by complete exposure of the whole body. This observation may explain why some cases of pulmonary tuberculosis "flare up" after light baths. *5.* An instrument has been devised by which the ultraviolet light may be measured. Actinic light is used in treatment in two ways: (1) Local treatment by concentrated light, particularly applicable to the form of tuberculosis of the skin known as lupus vulgaris; and (2) by subjecting the body to the sun's rays or to a powerful source of light rich in active radiations. Generally the initial dose, which can be borne with comfort, should give rise to no more than an evident reddening of the skin and a not unpleasant conscious tingling. Experience with initial doses has never shown any ill effects of an exposure of half an hour to the carbon-arc light or of two minutes to a 6-in. mercury-vapor burner. The stages of increase are, for administrative convenience, ascended at weekly intervals. The carbon-arc exposure is increased by half an hour at a time up to a maximum of four hours per day. In the mercury-vapor cases the initial two minutes to each side of the body is increased weekly by a minute to either side, to a maximum of twenty minutes to each side. The physiological effects observed on patients while exposed or after exposure to the light bath are as follows: *1.* The basal metabolism was examined in a number of patients before and after light-bath treatment by Campbell, of the National Institute of Medical Research. No change was observed in the patients examined. *2.* Blood counts were made in a number of patients, but no material alteration was noted. In some there was a slight increase in the leucocytes. *3.* Body weight, if below normal, was found to be increased. *4.* In children it was found that the rate of growth increased to, but not beyond, the normal. *5.* Improvement in mentality was noted in all cases. *6.* No change was found in the body temperature during or after the sittings. *7.* The pulse and respiration rates were unchanged. *8.* Blood pressure was unaltered. *9.* Patients constantly complain of thirst.—*The Practice of Artificial Light-Bath Treatment, J. H. Sequeira and W. J. O'Donovan, Lancet, May 2, 1925, ccviii, 909—(B. T. McM.)*

General Phototherapy with Electric Arc and Mercury Lamps.—The therapeutic effect of light baths differs with different forms of tuberculous localization. In tuberculosis of the skin the added application of condensed light (Finsen) results in 90 per cent of cures in 6 to 36 months. In nasal, buccal, pharyngeal, laryngeal, and ophthalmic tuberculosis light baths alone

will cure 80 per cent of cases in 12 to 36 months. *Tuberculous lymphadenitis* presents a more complicated problem. In general, the hyperplastic inflammatory forms are less responsive than the suppurative and fistulous. François and Reyn obtained by radiotherapy and artificial phototherapy the following results: Of 246 treated solely by radiotherapy 39 per cent cures; of the 150 failures 40 were given local application of concentrated light, with 39 cured; by combined radiotherapy and local concentrated phototherapy, 84 per cent of 112 cases were cured, and of 115 cases receiving also general light baths 93 per cent; of 81 cases receiving only general and local phototherapy, all but one were cured (99 per cent). The effect of light is general instead of purely local as with the roentgen rays, and recurrences and local inflammatory reactions are much less common. The treatment is, however, necessarily a long one, and tuberculosis is always slow to heal. The following schema of treatment is recommended in tuberculous adenitis: *A. Hyperplastic nonsuppurative forms: 1. Monoganglionary:* Extirpation when possible; when not, general light baths combined with filtered radiotherapy. *2. Pluriglandular without periadenitis:* General light baths; with periadenitis, light baths and filtered radiotherapy, unless there is a tendency to suppuration, in which case puncture or aspiration is indicated. *B. Suppurative forms:* Aspiration with the syringe, combined with light baths; in some cases incision is necessary. *C. Fistulous forms:* Regular manual expression, combined with dressing, later, gentle curettage with filtered radiotherapy, general light baths and local applications of condensed light. As to prognosis, recent cases respond best, and children better than adults. Suppurating and fistulous lymph nodes may heal with only a slight scarring of the skin, while the hyperplastic forms are prone to leave small fibrous nodular masses which are more troublesome. Ernst, of the Finsen Hospital of Copenhagen, has reported 444 cures among 554 cases of all kinds of surgical tuberculosis, or 80 per cent. Another very important indication for light baths is for prophylaxis, as an adjunct to the antituberculosis dispensary for the purpose of raising the general resistance of the debilitated. A third important indication for phototherapy is, of course, for rickets. *Contraindications* are precarious general condition, too advanced lung disease or marked hemorrhage tendency, or poorly compensated heart disease. Scientificially speaking, the actual mode of action of the light baths remains more or less undetermined. But the results are unquestionable. Generally speaking, the electric voltaic arc lamp gives results superior to the mercury-vapor lamp, while natural sunlight, especially by the seashore, surpasses both.—*Photothérapie générale avec les lampes à arc voltaique et à arc de mercure, F. François, Rev. Belge d. l. Tuberc., February, 1925, no. 2, 46.*—*(A. P.)*

Organization of Artificial Light Clinic.—This is a description of the organization and work of the light department at Alton, England. The light used is exclusively artificial as opposed to sunlight. It is apt to be forgotten by those contemplating artificial-light treatment on any considerable scale that this form of treatment is necessarily very expensive. The initial purchase of the lamps is only the beginning and not the end of a considerable expenditure. Much electric current must be consumed, the services of an electrician are essential, the plant must be maintained and renewed, experimental work is almost essential, numerous accessories must be purchased and a staff of nurses must be trained, retained and maintained. A large part of the light department is patterned after the Finsen Institute. The lamps used are Finsen carbon-arc lamps, air-cooled mercury-vapor lamps, tungsten-arc lamps and Finsen-Reyn lamps; also the "tunnel" which emits no ultraviolet light and is simply radiant luminous heat. By the use of quartz compressors which exsanguinate the part treated much deeper penetration of the light is possible. For general treatment of surgical tuberculosis the air-cooled mercury-vapor and tungsten-arc lamps have not proved to be as valuable as the carbon arc. The former are rapid in their action at first, but their value appears to diminish after a few treatments. In surgical tuberculosis they are more valuable for local lesions, sinuses, ulcerated lupus, suppurating or discharging lymph nodes, scrofuloderma, and the like. The water cooled iron-arc has a distinct value.—*Organization and Work of a Light Department in a Hospital for Surgical Tuberculosis, H. Gauvain, Lancet, July 4, 1925, ccix, 10.*—*(B. T. Mc.M.)*

Artificial Sunlight in Treatment of Internal Tuberculosis in Japan.—Successful treatment of internal tuberculosis by means of artificial sunlight is reported. In Japan it is impossible to use natural sunlight on the high mountains as is done in Europe, since the mountain peaks are always covered with heavy clouds.—*Therapy of Internal Tuberculosis by the Use of Artificial Sunlight, S. Ohsato and K. Watanabe, Tokyo Ijishinshi, 1925, no. 2404, Abstract from Japan Medical World, 1925, v, 68.*—*(M. M.)*

Dosage of Ultraviolet Rays.—Previous methods of dosage of ultraviolet rays are reviewed, and are considered inadequate in that they fail almost entirely to establish any relation to skin erythema. It is shown that all sources of light can be standardized by means of biological, chemical and skin reactions. Thus the time required to kill infusoria, to bleach a standard solution of acetone methylene blue a given amount, and to produce a definite erythema of the skin, may be determined under similar conditions, and correlated. Using these findings, it is convenient to express the dosage in terms of infusoria-killing units. Thus, since it takes, on an average, twice as long to produce a mild erythema of the skin as to kill infusoria, the erythema dose may be expressed as two *I.K.* units. Individual skin sensitiveness may be determined by exposing small areas of the abdomen to varying doses of light, and ascertaining the degree of erythema by means of a Lovibond tintometer. It has been found, from an investigation of 125 cases, that minimal erythema doses raise the bactericidal power of the blood, while excessive doses may produce a marked decrease in this power. It is apparent, therefore, that a scheme of dosage should be adopted which results in definite erythema, but which, since pigment acts as a screen, leads to slow pigmentation. When larger doses are required because of pigmentation, it is of advantage to use a great intensity of ultraviolet rays, to avoid overheating the body by prolonged exposure to the light. By using a double mercury-vapor lamp and double long-flame arc for seven minutes, a dosage is obtained which is equivalent to sixty minutes' exposure to the Finsen arc.—*Some Observations on the Dosage of Ultraviolet Rays in Artificial Sun Treatment, A. Eidinow, Lancet, August 15, 1925, ccix, 317.*—(*E. H. K.*)

Tissue Reactions to Ultraviolet Rays.—The subject of ultraviolet radiation has been thoroughly investigated on the purely physical side, but the same cannot be said of the physiological and therapeutic aspect of the subject. There are unaccountable variations in the response of different individuals to the action of the rays. Some patients pigment well and benefit greatly by the treatment; some merely freckle and may not do so well; others again pigment not at all or only slightly, deriving but little benefit from the treatment, though this is by no means invariably true. If investigation is carried out with a pure beam of ultraviolet rays, instead of employing the full solar spectrum, certain effects are rendered striking which would otherwise be masked. When different skins are examined in an ultraviolet beam, from which the visible wave-lengths are filtered out by means of Wood's glass, the skin presents a more or less generalized violet fluorescence. Fair skins fluoresce more brightly than dark, and skins of dark races do not show a general fluorescence, but only over certain special regions. The following are fluorescent structures: (1) The keratinized layer of the epidermis; (2) the nails; (3) white hair; and (4) the cornea and lens. Of the skin secretions, the sebum, the cerumen and the vernix caseosa of newborn infants fluoresce. Milk is also fluorescent. The nonfluorescent structures are (1) the pigment and pigmented epidermis; (2) pigmented claws (animals); and (3) pigmented hair (or fur in animals). Of the secretions, the sweat is nonfluorescent. The blood is also nonfluorescent. Both melanin and sebum prove, on spectrum analysis, to be powerfully absorbent of the ultraviolet rays. When a body is said to fluoresce in a beam of pure ultraviolet light, it means that a certain amount of the incident in visible beam is being converted into rays of longer and visible wave-length, and that the intensity of the ultraviolet is reduced by this amount at least. To prove that fluorescence is a protective phenomenon lard, lanoline and vaseline were applied to the skin of the forearm at different areas, and, with proper shielding, the arm was exposed to the light from a Cooper-Hewitt mercury-vapor lamp. In one hour after exposure erythema had developed over all areas except those smeared with yellow vaseline. Furthermore, all areas, with the exception of the vaselined area, developed pigmentation within a week, most marked in the control areas and in that smeared with lard. This result is easily explained by the fact that lard is nonfluorescent; lanoline fluoresces very much like human sebum, and yellow vaseline fluoresces very brilliantly. Further investigation showed that skin treated by lightly smearing with yellow vaseline is capable of standing three and one-half times the length of exposure necessary to produce the same degree of erythema in normal skin. White vaseline is less protective than yellow, and shows less absoption spectrographically. Other experiments were done which showed that skin reactions, up to a certain point, parallel the physical measurements of the intensity of radiation and that the cumulative effect of repeated small doses, if properly spaced, results in less erythema and pigmentation than the same amount (time) of continuous exposure. The best results were obtained with a ratio of "exposure" to a "rest" time of 1 to 50. *Conclusions*: 1. Since the skin surface radiation is rendered

visible by fluorescence when only the invisible ultraviolet rays fall upon it, it is obvious that a greater or less amount of the incident rays is being dissipated at the skin surface as light and is consequently incapable of acting on any of the deeper structures. Since fluorescence commences directly, the skin is exposed to ultraviolet rays, whereas pigmentation only occurs as a result of considerable exposures, it is logical to suppose that, in fluorescence, we have a more immediate protection from excessive radiation, as far as ultraviolet is concerned than in pigmentation. 3. Since all the fluorescent substances examined, as well as the melanin which causes pigmentation, show marked absorption of ultraviolet rays, and since fluorescence and pigmentation always seem to vary inversely as each other, it might be interpreted that pigmentation marks the failure of fluorescence to protect the structures of the cutis vera from excessive radiation. This is substantiated by the experiments on artificially increased fluorescence, where no pigmentation followed exposure. 4. If pigmentation of the patient is aimed at as a standard of successful treatment, this is tantamount to producing deliberately in the patient a natural and efficient protection against the very source of treatment employed. 5. The pigmentation must be regarded as an indication that the penetration of the rays has not been prevented by fluorescence of the skin surfaces. If pigmentation could be avoided without hindering the penetration of the rays to the cutis vera it might prove more beneficial. 6. By employing the maximum dose which will on each application just fail to produce pigmentation, and by separating the exposure by the minimum time-interval necessary to avoid the cumulative effect referred to, it should be possible to get equally good, if not better, therapeutic results in a shorter time.—*Quantitative Data in Tissue Reactions to Ultra-Violet Radiations, P. R. Peacock, Lancet, August 22, 1925, ccix, 369.—(J. S. W.)*

Blood Chemistry and Ultraviolet Rays.—The blood-chemistry changes resulting from ultraviolet radiation take place principally in two ways: first, through absorption of radioactivity from the rays by the red blood cells while circulating near the surface of the body upon which the rays are falling, and the carrying of radioactivity to certain glandular structures, thus influencing the hormone function; second, through the reflex action of the rays on certain cutaneous nerve endings which play a part in the physiological activities of the body. In both instances the ultimate results appear to influence physiological processes rather than to directly affect the blood itself. However, the action of the rays has a tendency to increase the calcium content of the blood. If this is above normal ultraviolet-ray therapy is contraindicated. If the pigmentation of the skin is progressive, as a result of ultraviolet-ray exposure, it is an index of defense against excessive blood-chemistry changes. If pigmentation does not take place after a considerable period of exposure, one may rest assured that such changes are more or less immaterial and may be disregarded. Pigmentation, therefore, may be used as a partial guide in this respect. In the case of tuberculous patients, the chest is covered if the condition involves the lungs. A series of cases are reported showing the beneficial effects of ultraviolet-ray therapy in pulmonary and extrapulmonary tuberculosis and eczema.—*A Further Study in Blood Chemistry and the Results of Ultraviolet Ray Therapy in Certain Tuberculous and Other Cases, F. A. Davis, Med. J. & Rec., August 19, 1925, cxxii, 188.—(J. S. W.)*

Biological Antagonism of Infrared and Ultraviolet Rays.—It was demonstrated that the infrared rays emitted by an ordinary electric light attenuated the effect of the ultraviolet rays of a quartz lamp used in bleaching cotton. This antagonistic action does not always exist, but when it does it is thought to depend not on the rays themselves but on the medium being rayed. Certain media bring about this antagonism; others do not. In general, we have little skin reaction in a sunny atmosphere, free from dust, because usually there are considerable infrared rays in it. In high altitudes, the cloud of water vapor, impermeable to infrared rays, is fairly dense, and skin reaction from ultraviolet is common. At the seashore the atmosphere is again rich in water vapor, and the ultraviolet rays cause a dermatitis quicker than in the interior of the country. It seems therefore that heliotherapy, the biological action of which is provided by the ultraviolet rays, should be practised either at the sea-shore or at high altitudes. Marine heliotherapy has the additional beneficial effect of ionization of the air, and is superior to ordinary sunshine or the quartz lamp.—*L'antagonism biologique des rayons infrarouges et ultra-violets, J. L. Pech, Congrès Internationale de Thallassothérapie, April 27–30, 1925, reported in Presse Méd., May 13, 1925, no. 38, 630.—(E. H. K.)*

X-Ray Treatment of Tuberculosis.—The roentgen-ray treatment of bone and joint tuberculosis is only an adjunct to other

methods of treatment. Results are best in disease of the upper extremities, while in those of the lower extremities longer periods of treatment are required, and even then results are not as satisfactory as those obtained in treating the upper extremities. The value of deep roentgen-ray treatment for pulmonary tuberculosis is still disputed. The largest number of observations is reported by Bacmeister (over 1,000 cases). According to him only the productive form, the fibroid and nodose, and of these only the slowly progressive, the stationary and those tending toward latency, should be radiated. All forms of progressive exudative caseous tuberculosis, and all rapidly progressive and caseating, and destructive forms of phthisis are to be excluded from treatment. Treatment is carried out, according to the Bacmeister scheme, with emphasis laid upon sufficient intervals between reactions. The rays are filtered through 4 mm. aluminum. Similar technique is followed by Lorey and Ziegler. In Ziegler's cases 38 per cent became free from bacilli. M. Fraenkel reported 180 cases, of which 97 became free from bacilli. He also emphasizes careful observations, quantitative and qualitative, of the leucocytes. Musante found a decrease of neutrophiles, and increase of alexins and specific antibodies 12 hours after apical raying, with a return to normal after 24 hours. Recently, more emphasis has been laid upon the homogeneous raying of the lung and a number of observers recommend heavy metal filters (0.5 mm. zinc or 1 mm. copper), beginning with a homogeneous raying of 2.5 to 5 per cent and increasing to 10 to 20 per cent, the focal skin distance being about 30 to 35 cm. Eventually, distant fields are also used. The roentgen-ray deep therapy of lymphatic tuberculosis, tuberculosis of the serous membranes, laynx, urogenital tract, intestines and skin, are further dealt with.—*Neuere Erfahrungen mit der Röntgentiefentherapie bei Tuberkulose. Kritischer Übersichtsbericht, H. Schulte-Tigges, Centralbl. f. d. ges. Tuberk.-Forsch., 1924, xxii, 1.*—*(H. J. C.)*

Radiotherapy in Treatment of Tuberculous Cervical Adenitis.—The place of radiotherapy in the treatment of cervical and axillary adenitis has not been finally determined. Hanford, in a recent study of over 300 cases, concludes that operation is indicated in a considerable proportion, but that the results with conservative treatment are so good that only those operations should be considered which are relatively easy and devoid of vein and nerve damage. Dowd's end-results of 91 per cent of cures by surgery in patients whose disease was limited to the upper cervical lymphatics would be hard to surpass. The series here studied comprised three main groups of cases. It is concluded that the uncertainty and tediousness of radiotherapy must be weighed against the operative risk and scarring of surgical procedure; that in three-fourths of unselected cases complete excision is impracticable or impossible, yet many can be definitely cured by roentgen-ray treatment; also that incision and aspiration have their necessary places.—*Radiotherapy in the Treatment of Tuberculous Cervical Adenitis, M. K. Smith and J. G. Hopkins, J. Am. M. Ass., July 25, 1925, lxxxv, 262.*—*(A. P.)*

Collapse Therapy in Pulmonary Tuberculosis.—Pulmonary hemorrhage is an indication for artificial pneumothorax when one can determine the bleeding side and when the bleeding is severe. Collapse of the opposite lung, however, may aggravate the bleeding. Pneumothorax as a therapeutic measure in pulmonary tuberculosis should not necessarily depend upon only the amount of tuberculosis in the diseased organs but upon the general clinical impression of the patient and on X-ray examination. The physical examination and the plate are both necessary. Unilateral tuberculosis constitutes the most favorable circumstance for pneumothorax, but a moderate amount of disease on the better side is not necessarily a contraindication. Adhesions, thickened pleura or thick-walled cavities are usually contraindications. Cavities sometimes become larger after pneumothorax on the same side. Thoracoplasty offers better results when the tissues are adherent. The pneumothorax must always be maintained for as long as two years for a favorable and permanent therapeutic result. This damages the nontuberculous portion of the lung, but not seriously. The prognosis is best in chronic types of the disease and least favorable in the productive types that show in the X-ray a thick seeding of the lung. Collapse in exudative tuberculosis is usually unwise because of the lack of tendency to heal and the frequency with which pleural complications occur. This is especially true of tuberculous pneumonia and bronchopneumonia and rapidly progressing phthisis. All severe complications of tuberculosis should be regarded as contraindications, particularly laryngeal and intestinal tuberculosis, as well as other serious bodily disease, such as heart or renal disease. In late cachectic tuberculosis, the procedure is usually futile. When a large part of the lung is irreparably damaged before pneumothorax is instituted, but little healing follows, and discontinuance of the treatment may lead to marked em-

physema of the healthy part as well as to marked distortion, displacement and dysfunction of thoracic viscera.—*Indikationen und Kontraindikationen der Lungenkollapsebehandlung bei Tuberkulose, H. Ulrici, Klin. Wchnschr., November 18, 1924, iii, 2154.—(H. S. W.)*

Development of Chest Surgery in Last Twenty Years.—Not only an extension of the operative indications in diseases of the chest was developed by surgical investigators, but there were important problems of physiology brought nearer to solution. The view that the diaphragm is an aid to respiration cannot be considered correct; it is rather a dividing membrane which prevents a suction of the abdominal organs toward the chest as a result of the negative pressure in the latter. The significance of the musculature of the bronchi for respiration has been elucidated, and the circulation of the blood in the lungs has been made clearer. The bronchial arteries serve as a supply to the lungs while the pulmonary vessels serve for gaseous exchange. The pulmonary artery can be ligated without causing death of the lung. A double pneumothorax is inconsistent with life. The surgical treatment of empyema has not been completely worked out. The type of procedure in any case depends upon the basic conditions. Rib resection must be withheld in influenzal empyema and suction procedures given the preference. Operations on the lungs are necessary in the presence of foreign bodies and bronchiectasis. In the former the results are good; in the latter more could be hoped for. The operative treatment of pulmonary tuberculosis has made decided advances in that one-third are permanently cured. The primary mortality of unilateral paravertebral resection of the first to the eleventh ribs increased to 24 per cent because the selection of cases is still difficult. Sauerbruch has reported on 700 operations. Artificial pneumothorax was considered in a rather reserved manner. If adhesions exist pneumothorax easily causes rupture and exudates. The mortality with exudates is fearfully high. Here extrapleural thoracoplasty accomplishes much more.—*Der Stand der Chirurgie der Brustorgane auf Grund der Entwicklung in den letzten 20 Jahren, F. Sauerbruch, Arch. f. klin. Chir., 1924, cxxxiii, 277.—(H. J. C.)*

Surgical Treatment of Pulmonary Tuberculosis.—It is hardly four years since French surgeons began to give this subject much attention, led by Bérard (of Lyons) and Dumarest (of Hauteville), who began their work, however, eleven years ago, interested by the results in Germany. One of the present authors has assisted at about 60 cases and has seen the results, both successes and failures. The objects set forth are to reply to those who deny the efficaciousness of surgical methods, and to set forth the methods employed and the measures for reducing the risks. Case reports to the number of 28 are cited for thoracoplasty, and the bad results in certain cases discussed. Unfortunately, there exists no means of anticipating events and foreseeing how the individual will tolerate thoracoplasty. Certainly, some subjects who could not be expected to benefit ought to be eliminated, for as Dumarest says: "thoracoplasty does not offer, as does pneumothorax, the resource of beating a retreat if unsuccessful; it is irreparable." Certain deaths or failures are charged to poor selection of cases; others to the surgical procedure itself. Among them are patients dying within forty-eight hours after operaton, sometimes only a few hours after an apparently satisfactory total thoracoplasty. Such cases can be rendered fewer by tempering the severity of the procedure. *Indications and purposes:* (1) To replace an attempted pneumothorax impossible to realize, (2) following a pneumothorax abandoned for various reasons, (3) to supplement a partial pneumothorax, (4) for pulmonary perforation complicating pneumothorax, and (5) as a hemostatic or as a procedure preferable to pneumothorax. *To replace an attempted but impossible pneumothorax:* This is the most frequent indication. Operation here should be reserved for the predominantly destructive forms of phthisis; that is, extensive fibrocaseous ulcerative disease. Acute and subacute forms should not be attempted. The lesions must be clinically unilateral, and have been followed several months with the aid of good serial roentgenograms. Inactive lesions are more apt to be reactivated than is the case with pneumothorax, and the operative procedure cannot be undone. The pleura ought also to be adherent, or the gravity of intervention increases much. As soon as, in a suitable case, it is evident that pneumothorax will not be effective, operation should be considered, while the patient is still in good condition to stand it. There ought, however, to be evidence of retraction of the affected lung and hemithorax, with some tendency to fibrosis. Retraction of the mediastinum is favorable evidence. Thoracoplasty exerts its effect more by favoring fibrosis than by actual lung compression. Rigid-walled cavities are often very poorly collapsed. Immobilization is also an important factor. The benefits are not always proportionate to the dimensions of the resected portions of

ribs. Generally speaking, operation should he reserved for cases of fairly long-standing tisease which have had the benefit of the hygienic cure. Febrile patients are not good patients, as a rule. Again, the patient should be operated on at a sanatorium, and sanatorium treatment should follow operation. The responsibility of the physician or phthisiologist is even greater than that of the surgeon. He should have had experience with pneumothorax therapy and its results, and should collaborate closely. The classical contraindications to operation are extreme age or youth, renal, cardiac and diabetic disease, and acute or bilateral lesions. One should not operate on readily dyspneic subjects, nor the cyanotic, nor those with clubbed fingers and very narrow chest. A left thoracoplasty is better borne than a right. *Thoracoplasty following an abandoned pneumothorax:* This is indicated if there is any evidence of a reactivation. *Thoracoplasty combined with partial pneumothorax:* This combination is theoretically good, practically difficult to accomplish. When there is a large anterior superficial cavity which is adherent, portions of the second to fifth ribs anteriorly may be resected; when the cavity is posteriorly situated the classical operation had better be done. Alexander and others prefer thoracoplasty to Jacobeus's method of severing adhesions, which they consider dangerous. *Thoracoplasty for pulmonary perforation:* The tendency of such fistulas is to persist and enlarge and to infect the pleura. In such cases, left alone, the vast majority are eventually fatal, while thoracoplasty may close the hole and reestablish collapse of the lung. *As preferable to pneumothorax:* Such an occasion is very rare, as even a mediocre pneumothorax is better than a thoracoplasty, and one can improve the collpase by a simple phrenicotomy. Bérard and Dumarest, however, prefer thoracoplasty for certain basal ulcerative lesions. *Operative procedure:* The classical posterior paravertebral thoracoplasty of Sauerbruch is described. There should be removed 10 cm. of the eleventh rib, 12 cm. of the tenth, 15 or 16 cm. up to the fourth inclusive, 12 cm. of the third. It is important to remove 7 or 8 cm. of the second rib and 2 to 3 cm. of the first, a total resection of 130 to 150 cm. of ribs. The method of anesthesia has been much discussed. To-day, after having been favored at the beginning, regional is yielding to general anesthesia. Sauerbruch, Bull and others have thus changed their viewpoint. As a matter of fact, few operations are terminated without recourse to general anesthesia. Bérard has remarked that regional anesthesia is ideal when completely effective; when necessary to supplement with general anesthesia he recommends ethyl chloride or ether. His practic: is to administer, the evening before operation, 60 drops of somnifen; one-half hour previous to operation he injects 0.01 gm. morphine and 0.25 gm. caffeine. He then starts with regional anesthesia, but as soon as the patient experiences pain switches to ether or gas. Spinal anesthesia has been recommended and tried with uncertain results. Intravenousa nesthesia with somnifen in one attempted case caused violent agitation. Pulmonary reactions and postoperative deaths have appeared to be as common after regional as after general anesthesia. Partial thoracectomy is relatively benign, while total posterior thoracoplasty is a grave operation. The partial operation, however, produces much less of a collapse, which at best is localized, and dissemination of the disease to other parts may occur. Lilienthal compared the bony framework of the chest to a Venetian blind. Sauerbruch believes partial operations give only temporary effects. Excellent results, however, may be obtained in carefully selected cases with partial operation, especially in right upper lobitis and with basal cavities. Parasternal thoracoplasty is only acceptable for ulcerative lesions limited to the anterior aspect of the upper lobe. For extensive fibrocaseous and ulcerative lesions total paravertebral thoracoplasty is indicated, but should be divided into several stages. Bull finds a mortality of 4.5 per cent for 71 two-stage operations, and 30 per cent for 21 single-stage perations. Most authors recommend beginning below and resecting at least 7 ribs at the first sitting; the reverse procedure is less advisable because of the danger of disseminating the secretions from above throughout the lung. Intervention in the cases of pyopneumothorax with pulmonary perforation has not been as successful as in uncomplicated cases. Of 8 cases observed, 2 were cured, 1 improved, 1 temporarily improved and later died, and there were 4 other deaths. The lowered vitality and grave infection of these patients are factors; spasmodic coughing and vomiting prevent rest, and the chest-wall is generally infected, with nodules or caseating sinuses. Even after operation there is a residual cavity which continues to secrete pus. These patients should be operated on early, and drainage should accompany or precede thoracectomy. *Phrenicotomy;* Generally speaking, phrenicotomy alone is not to be recommended, but only combined with or as preliminary to other measures. Eight cases are cited. The effects of simple phrenicotomy, although it is a benign and easy operation, are far below those of

thoracoplasty as regards its influence on pulmonary tuberculosis. In only one of the above cases can it be said to have exerted much effect, and certainly cannot be recommended for bilateral lesions. *Conclusions:* It is worth while to compare the results and indications of pneumothorax with those of surgery, although there is seldom the question of choice between the two. Thoracoplasty seems to have fewer indications and to be applicable generally to different forms and stages of the disease. The immediate risks in thoracoplasty are incomparably greater, and invasion of the opposite lung much more common. The best thoracoplasty gives a collapse hardly 75 per cent of that furnished by a good pneumothorax. However, the patient is protected from pleural complications and there is no need for reinsufflations. The good results are less immediately striking, but usually develop and increase gradually. There is little mutilation. The working capacity improves and may become normal. The stethoscopic signs are apt to be misleading as regards prognosis, and may persist with little change. The ultimate results are, roughly, one-third cures, one-third ameliorations and one-third failures.—*Réflexions sur le traitement chirurgical de la tuberculose pulmonaire, M. Guilleminet and J. Madinier, Rev. de la Tuberculose, June, 1925, vi, 318.*—(*A. P.*)

Surgical Treatment of Pulmonary Tuberculosis.—The general practitioner, even the general internist, and perhaps still more the general surgeon, is still unfamiliar with the fact that certain patients with pulmonary tuberculosis, whose future is otherwise hopeless, can be, by operation, not merely improved as to their distressing symptoms, but to all intents and purposes practically cured. Cough may be abolished, sputum disappear, fever and pulse-rate become normal, and the patient be able to do a reasonable amount of work. But it is extremely important, if this branch of the therapy of tuberculosis is not to suffer undeserved discredit from misapplication, that a proper selection of cases for operation be made. Briefly, the best case for operation is the "good chronic" with practically unilateral disease, with only slight and old trouble in the other lung, in whom there is definite evidence of nature's attempt to heal through fibrosis; in whom artificial pneumothorax has failed because of pleural adhesions; and in whom no evidence of spreading tuberculosis in other organs, or of any other serious diseases, can be found. Such a patient is frequently afebrile and can be allowed a certain amount of exercise; but is living in constant danger of an extension of the disease, and his ultimate outlook is certainly not good. But the indications need not be set quite so narrowly as this. There are also chronic cases that are not so good, whose progress gives cause for immediate alarm. The course of the disease is definitely downward, and the patient is "slipping" slowly or rapidly. Provided, however, that the trouble remains chiefly unilateral and there is no active disease on the good side, operation is still to be considered, and is still attempted with a gratifying measure of success. The operation consists in a resection of varying lengths of the ribs, posteriorly, from the first to the tenth or eleventh. It is done subperiosteally, and the parietal pleura should not be broken through. It is, therefore, called an *extrapleural thoracoplasty.* It should be done in two stages at least, occasionally in three, in order to avoid certain dangers and to keep the immediate mortality low. It is done posteriorly, because in this region the spring of the ribs is such that rib resection allows the anterior ends to fall further in, and reduces the lung volume more than if it were done anteriorly. As to the anesthetic, gas-oxygen combined with procaine is preferred. The rationale of the operation may be summed up in two words, rest and compression; and of the two it is probable that rest is the more important. The mechanical factor of compression is useful in bringing about a reduction in the size of cavities and their ultimate disappearance, with cure through scarring. The removal of sections of all the ribs gives rest to the lung by reason of the simple fact that the operation cuts an important link in the chain of respiratory movement. Without an intact thoracic skeleton, rib movements become impossible, and therefore inspiration and expiration on that side are impossible save for diaphragmatic movement. Any flow of air into or out of the lung becomes largely passive. As a result, the lung is given rest, and rest is the cardinal principle of the treatment of tuberculosis anywhere. Not only this, but the absorption of toxins from tuberculous tissue through the lymphatics is usually stopped by the mechanical compression of the diseased lung. In the case of active bilateral disease pneumothorax can sometimes be tried, but thoracoplasty should not be attempted. The former measure allows for a retreat on the first threat of an unfavorable reaction, while from thoracoplasty there is no drawing back. Extensive tuberculosis in other organs is a contraindication, except in a given case in which either intestinal or laryngeal tuberculosis is obviously chronic and the patient's resistance seems sufficient to hold within bounds these

extraneous manifestations. Cases with serious nontuberculous diseases, such as nephritis or a hepatic cirrhosis or a serious cardiac lesion, should not be accepted for operation. The results obtained in the author's series of 56 cases in which a thoracoplasty was done are as follows: In 42 cases operated on over one year and up to twelve years ago, 12 were practically cured, 12 greatly improved, 4 improved, and 14 are dead. Only two deaths occurred in the first three weeks. In 14 cases operated on under one year ago, 3 were greatly improved, 7 improved, 2 became stationary or worse, and 1 died. In only 3 of these 56 cases could it be said that the operation had apparently been the cause of an extension of the disease in the other lung. Results have usually shown extraordinary benefit from the operation in patients who are still in good condition; hence thoracoplasty should not be deferred until performed as a last resort. When a patient is judged to be a suitable case for artificial pneumothorax, and this is thereupon found impossible or insufficient because of pleural adhesions, then, at that very moment, without further delay, a thoracoplasty should with rare exception be advised. The selection of the cases must belong in the first instance to the physician, but the surgeon also must acquire the ability to estimate the resistance of any given patient to the procedure proposed. Teamwork is essential. The surgeon must be familiar with not merely the carrying out of the operation, but must give special attention to postoperative care. He must have special knowledge as to the posturing of the patient; as to bandaging to support the partially unsupported thorax; of stimulants and sedatives; of how much to encourage coughing and how much to discourage it; and how much to prevent it. A rigid regimen in bed or in chair is imperative in all cases for the first six to twelve months after the operation. The additional operation of apicolysis is reserved for good cases in which there remains a residual apical cavity, while the rest of the lung is well compressed and the disease apparently halted. When posterior thoracoplasty has failed to bring about marked improvement, the chances of benefit from an added apicolysis are too small and the risk too great to justify it. The author does not advise the routine cutting of the phrenic nerve (phrenicotomy) as a preliminary operation.—*Pulmonary Tuberculosis: Its Surgical Treatment, E. Archibald, J. Am. M. Ass., August 29, 1925, lxxxv, 663.*—(*J. S. W.*)

Surgical Treatment of Pulmonary Tuberculosis.—Operative treatment of tuberculosis of the lungs has undergone numerous changes during the last fifteen years, passing from the Brauer-Friedrich thoracoplasty, through the extensive use of paraffin and fat, to phrenicotomy and Sauerbruch's paravertebral thoracoplasty, which is by far the most valuable method. In the latter operation local anesthesia of the intercostal nerves is used except in a few excitable patients. The operation is done in two stages and long pieces of the ribs are removed. General criteria must be taken into account, such as the condition of the lung on the opposite side and of the hilum, and the general condition of the patient. Occasionally the other lung, which appeared in good condition at the time of operation, develops tuberculosis, and the prognosis is then always uncertain. Those with fibrotic changes in the better side do better than those with exudative changes. The operation should not be performed when marked bilateral disease, renal disease, or multiple foci of bone or viscera are present. Of the 55 thoracoplasties done, 11 died, 3 of them at or just after operation, 10 are clinically healed (one to four years), and 8 are considerably improved and bacilli-free. After operation there are impairment of the percussion note, bronchial breathing, râles and adventitious sounds. Phrenicotomy has numerous indications, such as incomplete pneumothorax from basal adhesions, the development of empyema during pneumothorax, when the "good" side is not quite free from disease, etc. Results from phrenicotomy are anatomically limited and are not permanent. It is not of itself a very good procedure and is usually used as a complement to artificial pneumothorax. On the whole the combination is very valuable. All patients on whom thoracoplasty, phrenicotomy, or other such surgical procedures have been instituted should by all means be continued under sanatorium treatment. These are last-resort measures and, in this light, the results should be considered as good.—*Erfahrungen mit der operativen Behandlung der Lungentuberkulose, W. Denk, Wien. klin. Wchnschr., January 1, 1925, xxxviii, 19.*—(*H. S. W.*)

Surgical Treatment of Pulmonary Tuberculosis.—The modern surgical treatment of pulmonary tuberculosis consists, above all, in immobilization of the diseased parts by collapse. There are three main measures for accomplishing this to-day: artificial pneumothorax, extrapleural plombage and extrapleural thoracoplasty. *Extrapleural plombage:* Whatever the material used for plugging, organic or inorganic, the extent of the collapse produced is insufficient or problematical. If these agents are done

away with too soon, by absorption or extrusion, the subjacent lung substance begins to resume function. No doubt some fibrous tissue will have developed and recovery may be materially aided, but often insufficiently, and as a general practice plombage cannot be greatly recommended. *Extrapleural thoracoplasty:* The technique of this operation is now well established, largely owing to Sauerbruch. The preferred method of anesthesia is the paravertebral one, with novocaine, but a good general anesthetic is better than a bad local one. The removal of the first and second ribs is the most difficult but an essential part of the operation. Resection of the eleventh rib has the advantage of allowing a considerable ascent of the diaphragm. Generally speaking, thoracoplasty is indicated whenever artificial pneumothorax is insufficient or impossible owing to adhesions. It may also be used in connection with a pneumothorax which has been prolonged over a long period, and when attempted decompresion is followed by bad results. Especially among the poor and working classes, much time may often be thus gained and the patient rendered independent of the doctor. Exacerbation of foci in the contralateral lung is most apt to occur in badly chosen cases; also, tuberculous foci in other organs may show signs of activity, probably due to liberation of tuberculin or bacillary products. On the other hand, contralateral foci may greatly improve. Any serious disease of the viscera affecting general health, whether tuberculous or not, is adequate reason for rejection of a patient for operation. To summarize, the principal indications, exclusive of the contralateral lung, are (1) insufficient effect produced by artificial pneumothorax; (2) impossibility of inducing artificial pneumothorax; (3) the patient's economic situation; (4) repeated hemoptysis; (5) chronic tuberculosis, empyema and pyopneumothorax not responding to ordinary medical treatment, or showing cutaneous fistulae; and (6) rare cases of mechanical kinking of trachea, etc., due to sclerosis. Contraindications are bad general condition, acute tuberculosis, and multiple, acute advanced tuberculosis of other organs. There is generally an immediate febrile reaction to the operation, subsiding gradually within few weeks; persistence or increase of fever is an unfavorable sign. The sputum, at first increased, gradually diminishes. Cavities retract rapidly and pulmonary sclerosis occurs. Numerous râles, however, may be audible for a long time. Transmission of pathological signs to the opposite side of the chest is common. The after-treatment consists chiefly in measures to raise general resistance. *Phrenicotomy:* Felix has introduced a method of resection by tearing out the terminal diaphragmatic branches of the nerve and its accessory nerve, after locating the trunk of the nerve on the anterior surface of the scalenus anticus. This can be done under local anesthesia in even very seriously ill patients. There results a paralysis and elevation of the corresponding half of the diaphragm. Indications are (1) severe unilateral cases with persistent cavity; and (2) as preliminary to thoracoplasty.—*A Review of Present Day Surgical Treatment of Pulmonary Tuberculosis, B. Hudson, Brit. J. Tuberc., July, 1925, xix, 127.*—(*A. P.*)

Surgical Treatment of Pulmonary Tuberculosis.—Whenever indicated, cord-like adhesions preventing a complete pneumothorax may be severed, one by one, under direct vision through the thorascope with a tenotome or better still by the electrocautery. When the layers of the pleura are inextricably bound together there are two kinds of operations: (1) Those which aim at detaching the parietal pleura from the ribs, the two pleural layers remaining fused together, and producing pressure on the lung and collapse of it, by introducing various substances between the ribs and the pleura which has been stripped off them (in this case no ribs need be removed and no deformity is produced). (2) Operations which are designed to remove large portions of the bony wall of the chest, thereby allowing the chest-wall to fall in and the lung to collapse. The first type is called an *extrapleural pneumolysis.* The chief advantage lies in its ease, the fact that it can be performed in twenty minutes under gas, and that no ribs are removed, no deformity produced, and practically no shock caused. There is a future for this operation, and experimental work remains to be undertaken in order to try to obtain a more suitable substance with which to pack the extrapleural cavity. The second type of operation is *thoracoplasty.* The operation is frequently performed under local anesthesia, but it is undoubtedly better and easier to do it under gas and oxygen with morphine or under simple ether anesthesia. It is hardly ever necessary to perform the operation in two stages. A phrenicotomy may be performed in combination with a thoracoplasty with considerable advantage. The results of these extensive thoracoplasties have been very encouraging so far.—*Surgery of Pulmonary Tuberculosis, W. H. C. Romanis, Brit. J. Tuberc., April, 1925, xix, 74.*—(*B. T. McM.*)

Toxicity of Blood Serum after Surgical Treatment of Pulmonary Tuberculosis.—Severe cases of pulmonary tuberculosis,

treated by thoracoplasty, frequently have a typical reaction with elevation of temperature. The toxic exanthemata that are seen remind one of the skin manifestations noted during the use of tuberculin, especially those occurring after large doses. They strengthen the opinion that a kind of tuberculin reaction is going on. According to Sauerbruch they originate from the compression occasioned by the operation, which squeezes toxic substances out into the lymph-stream, especially in severe cases of pulmonary tuberculosis. Eventually the lymph channels are occluded, as a result of the collapse, and the toxic substances are prevented from causing further reactions. Sauerbruch and Naegeli in 1913 attempted to find these substances in the blood serum and in 1922 the Munich clinic continued these experiments. *In vitro*, no satisfactory information resulted from complement-fixation tests; therefore tests on tuberculous guinea pigs were undertaken by injecting the serum (3 cc. intraperitoneally) into tuberculous guinea pigs in order to determine acute toxic manifestations, and also whether the serum from operative cases retarded or hastened the tuberculosis in the animals. Acute death within 48 hours was the criterion of the presence of toxic substances. About 20 per cent of the guinea pigs receiving the serum died. At postmortem they revealed the general picture of a florid generalized tuberculosis, but it was not possible to determine whether the animals died from a specific intoxication. Against this view was the fact that there were no specific acute inflammatory changes in the vicinity of the tuberculous foci. In favor of the view was the fact that none of the tuberculous animals died from the injection of serum from normal human beings, and only one animal died acutely that was given the serum of a case of pulmonary tuberculosis before thoracoplasty had been performed. In this case, however, there had been an avulsion of the phrenic nerve, and the serum also proved toxic after thoracoplasty. Further experiments with filtered serum from operated patients are being pursued.—*Serumuntersuchungen bei chirurgisch behandelten Lungentuberkulösen, W. Graf, Deutsche Zeitschr. f. Chir., 1924, clxxxviii, 418.—(H. J. C.)*

Thoracectomy in Pulmonary Tuberculosis.—Since the first publications of Cérenville in 1885, the operations of Quincke in 1888, and Carl Spengler, in 1889, every country of central and northern Europe except France has been devoting much attention to rib-resection operations, for the purpose of cicatricizing by an energetic and permanent compression lesions of a tuberculous lung, when these lesions cannot be helped by artificial pneumothorax because of pleural adhesions. The operation is being performed in cases in which artificial pneumothorax has failed and again when there is intractable hemoptysis, spontaneous pneumothorax or pyopneumothorax following nitrogen injections, and the life of the patient is greatly endangered. Before thoracectomy is attempted the following points must be established by careful observation: The exact location of the lesion, the soundness of the other lung, the heart, liver and kidneys, the temperature curve, and general powers of resistance. The best chance of cure occurs in patients who are afebrile and fairly nourished, and have a normal heart. It is best for the patient to be away from the sanatorium as short a time as possible for the operation. It is preferable to perform the operation in two stages, resecting the lower 7 or 8 ribs at the first and the upper 3 at the second operation. It is often advantageous to perform phrenicotomy first, in cases in which the movement of the diaphragm on the affected side is not too limited by extensive adhesions of the costodiaphragmatic sinus. The operative mortality of thoracectomy in two stages is practically nil. That the immediate mortality of the operation in France exceeds 20 per cent is attributed to the fact that the medical profession considers it as an uncertain and dangerous procedure, and imparts this attitude to the patient, so that when it is attempted it is generally as a last resort and when the patient is in very bad condition. It is to be hoped that when physicians and patients shall have been taught what may be expected from radical and early thoracectomy in unilateral pulmonary tuberculosis the number of satisfactory cures after several years will exceed, as it does in other countries, 60 to 70 per cent, and postoperative deaths will not exceed 3 to 10 per cent. Thoracectomy limited to the lower 7 or 8 ribs should be practised when the tuberculous lesions are at the base, because the frequency of pleural adhesions when the lesions are in this locality precludes the possibility of artificial pneumothorax. The case of a woman of 29 years, who following childbirth developed a pleural effusion and an extensive lesion of the right lower lobe with cavity, is cited. After careful observation, resection of 8 ribs, fourth to eleventh inclusive, was made under local anesthesia. After several days, her temperature, which had previously reached 100.5°F. daily, became normal. Cough and expectoration practically disappeared, and recovery was excellent. It is pointed out that thoracoplasty is an especially desirable method of treatment in unilateral

cases with tendency to adhesions in the working class, who have neither the time nor money to submit to repeated attempts at pneumothorax, because the operation enables them to do some work in a few months. In all classes it is desirable to reduce the number of therapeutic risks to a minimum. While there is a small number of cures with artificial pneumothorax, many remain with their condition only somewhat improved, and have to continue taking treatment and running the risk of complications for two, three or six years. According to Bernard and Baron 60 per cent develop pleural effusions, while 6 per cent of these become purulent and have serious consequences. In summary, if it is considered that 10 per cent of all cases of pulmonary tuberculosis are clinically unilateral, half of these, or 5 per cent, should be benefited by early thoracectomy because of pleural adhesions or the rapidly developing complications which an attempt at artificial pneumothorax would cause.—*La thoracectomie chez les tuberculeux et l'opinion médicale française, Bérard, Presse Méd., March 18, 1925, no. 22, 346.*—(*E. H. K.*)

Rest of Lung in Treatment of Pulmonary Tuberculosis.—No specific therapy can displace sanatorium treatment in tuberculosis. Rest of the diseased organ plays the greatest rôle in treatment. Protective rest of the lung brings about healing, while stimulation attempts to encourage a dormant resistance. Rest of the diseased lung diminishes the circulation and occasions a venous-stasis hyperemia which is of tremendous therapeutic value. In addition, there is a lymphatic stasis which causes an accumulation of protective substances at the diseased focus, resulting in encapsulation. If rest does not suffice operative procedures come into consideration, such as artificial pneumothorax, phrenic-nerve operations, extrapleural thoracoplasty and pneumolysis. The danger of spread of bacteria from cavities, and of hemoptysis, is markedly diminished by these measures. Absolute unilateral limitation of the disease is not essential as long as the other side is not actively diseased. Rapid unilateral progressive disease may be a contraindication to pneumothorax since the dense infiltration will not permit a complete collapse. Disease of the other organs, with the exception of the larynx, is also a contraindication. The length of time necessary to maintain pneumothorax is dependent upon the type of the disease and the anatomic condition of the lung. Promiscuous pneumothorax treatment is warned against. Thin bands of adhesions may disappear spontaneously. Brauer's figures for pneumothorax are cited. Phrenicotomy reduces the lung volume by about one-quarter. In about 25 per cent of all people an accessory phrenic nerve is present. Diagnostically, the exairesis is of value in determining whether the better lung can stand the procedure. In many cases phrenicotomy results in a diminution of fever, sputum and subjective symptoms, and therefore it can be used alone. Apicolysis and pneumolysis are of value in well-demarcated cavities. The most important method in collapse therapy is extensive extrapleural thoracoplasty, and in many cases in which pneumothorax cannot be performed it is the operation of choice. The lung is thus brought to permanent rest. The first and eleventh ribs are always to be resected. It is better to remove too much than too little. General narcosis is not preferred. High fever and complications in which artificial pneumothorax are contraindicated also contraindicate thoracoplasty. Aspiration pneumonia must be carefully guarded against. Partial thoracoplasties are not to be considered. Every fifth case in the sanatorium is suitable for operative treatment.—*Bekämpfung der Lungentuberkulose durch Ruhigstellung der Lunge, O. Ziegler, Ztschr. f. Tuberk., 1924, xl, 485.*—(*H. J. C.*)

Extrapleural Thoracoplasty in Pulmonary Tuberculosis.—Thoracic surgery is the youngest of the surgical specialties. It was in 1912 that Archibald performed the first thoracoplasty in America for pulmonary tuberculosis. In Germany and the Scandinavian countries surgical compression has been in use about fifteen years. The operation is especially indicated for advanced unilateral tuberculosis when sanatorium treatment and artificial pneumothorax have failed. A very limited process in the opposite lung, especially when confined to the apex, is not a contraindication. The degree of activity should also be estimated, and here clinical experience is of greatest value. The operation should not be regarded as a last resort. It is especially indicated for lower-lobe lesions and recurrent severe hemoptyses when artificial pneumothorax is impossible. Patients with fibrosis and cavitation, with contraction of the lung, are proper subjects. The condition of the heart and kidneys is important. Local anesthesia has been advocated, but Whittemore has noticed that patients thus operated on are extremely apprehensive and go through much mental anguish. He now prefers gas and oxygen or ethylene. Archibald combines gas and oxygen with local anesthesia in some cases. Sauerbruch uses

ether. The length of ribs excised will depend upon conditions met with. Apicolysis may be useful when there is an apical cavity alone, but ordinarily a posterior thoracoplasty is to be done first. The results of surgery seem amazing when one considers the poor condition of the patients. The immediate operative mortality does not exceed 10 per cent, and 5 per cent is probably more nearly correct. In some cases the immediate results are spectacular. The ultimate or later results, as found by Alexander, among 1,024 collected cases, show roughly one-third cured, one-third improved or much improved, and one-third not improved or worse.—*Thoracoplasty in Advanced Pulmonary Tuberculosis, W. Whittemore, Boston M. & S. J., September 17, 1925, cxciii, 542.—(A. P.)*

Extrapleural Thoracoplasty in Pulmonary Tuberculosis.—The frequent failure of modern sanatorium treatment to arrest the progress of pulmonary tuberculosis in the ulcerative stage; the impracticability of pneumothorax therapy in many such patients because of adhesions; and the establishment of surgical collapse as a definite procedure in suitable advanced cases of tuberculosis, are responsible for the recent merited recognition and increasing advocacy of extrapleural thoracoplasty in chronic phthisis. Differences of opinion exist as to the choice of anesthesia, the number of stages in which the operation should be performed, the amount of rib to be removed and whether resection should proceed from below upward or *vice versa* but the essential principle remains extrapleural resection of the posterior portion of the ribs, close to the transverse processes of the vertebrae. Sauerbruch has repeatedly suggested that resection should be performed from below upward, and Brauer also collapses the lower lobe first, but resects longer portions, especially beneath the scapula. Lambert and Miller, and recently Lilienthal, advise that thoracoplasty be performed from above downward, in order to affect early the toxemia from the more involved upper portions, and also to permit easier coughing and expulsion of secretion from the lungs. Thearle, from personal experience, thoroughly agrees with Sauerbruch and the majority of thoracic surgeons, that the lower lobes should always be first collapsed. Thoracoplasty in general presents indications similar to those of pneumothorax; the patients mostly belong to the chronic fibrous group with cavitation. Surgical collapse is also indicated in similar advanced cases for recurrent hemorrhages, which pneumothorax fails to arrest, and in selected cases of acute pyopneumothorax. Advantages of artificial pneumothorax over thoracoplasty are: (1) It is simple and relatively safe; (2) it is devoid of shock and deformity; (3) collapse is gradually induced; and (4) reëxpansion of the collapsed lung is possible if lesions develop or extend in the better lung. Thoracoplasty possesses the following advantages over air compression: (1) Immediate permanent collapse influences the course of the disease more promptly and definitely; (2) the patient is spared the long siege of medical supervision and refills necessary with pneumothorax; (3) the not infrequent activation of disease in a lung allowed to reëxpand after apparent cure is avoided. A single-stage collapse is associated with stormy first week convalescence and a high mortality. A two, and occasionally a three-stage Sauerbruch collapse of 10 cm. rib resection, with its comparatively low mortality, is the most suitable method of thoracoplasty for most cases. Occasionally a wider resection of the Brauer type will be required. Phrenicotomy tests the effect of additional work on the better lung, gradually paves the way for visceral readjustment, and probably reduces the danger of aspiration. The results reported in a series of 60 thoracoplasties are disease arrested in 30 per cent, improved 25 per cent, and mortality 18 per cent.—*Extrapleural Thoracoplasty in Pulmonary Tuberculosis, W. H. Thearle, Med. J. and Rec., October 7, 1925, cxxii, 399.—(A. P.)*

Extrapleural Thoracoplasty in Pulmonary Tuberculosis.—The results obtained with this operation, not only in France but in the various countries where the method has been used, are briefly reviewed. There is a fairly complete resumé of the figures of those who have published any extensive series of cases. The author adds no new cases of his own.—*La thoracoplastie extrapleurale dans le traitement de la tuberculose pulmonaire, J. Valtis, Ann. d. Méd., March, 1925, xvii, 271.—(W. B. S.)*

Phrenicotomy.—Knowledge of the anatomy of the phrenic nerve has been enriched by the observations of Walter and Willy Felix, and of Goetze. The nerve originates from the fourth cervical cord and can have branches to the third and fifth. Sympathetic branches can come from the lower cervical and upper thoracic ganglia and probably also from the coeliac plexus. The exact course of the nerve was described by these authors, and it is important to realize for operative purposes that variations in its course can occur. Walter Felix describes a doubling of the nerve, with two

strands about 3 cm. apart which may combine upon entering the chest. This variation can occur in about 20 to 25 per cent of the cases. Experimental observations on animals by K. Kure have clarified the innervation of the diaphragm. In monkeys it was found that (1) cutting of the motor root of the left phrenic caused complete immobilization, but only a moderate elevation of the left diaphragm occurred; (2) extirpation of the left cervical sympathetic caused only indefinite elevation of the left diaphragm; (3) extirpation of the left coeliac ganglion also resulted in a limited elevation of the diaphragm; (4) complete extirpation of the sympathetic of the left diaphragm produced only a limited elevation; (5) evulsions of the left phrenic, combined with extirpation of the left coeliac ganglion, occasioned much elevation of the left diaphragm; (6) evulsion of the left phrenic alone caused high-grade paralysis of the left diaphragm. The original Stuertz operation consisted simply in cutting the phrenic where it passes over the scalenus anterior muscle. This was early utilized by Oehlecker and Sauerbruch. Felix found that in one-quarter to one-third of the cases the old operation proved unsatisfactory because of the regeneration of the nerve. There resulted then two operative procedures: (1) the phrenic exairesis of Felix and Lebsche which consisted in severing the nerve and by rotation gradually pulling out 30 to 40 cm. of it; (2) the so called radical phrenicotomy of Goetze in which the phrenic is found on the scalenus anterior muscle, after which the phrenic main branch is drawn out to the inferior cervical ganglion, where the sympathetic fibres are cut and the nerve itself sectioned below this region. The Felix method has the advantages of not occasioning hemorrhages or traumatic pneumothorax and not tearing tuberculous pulmonary lesions. Brauer and Spengler fear hemorrhages from the pericardiophrenic artery following exairesis, but these are rare. Stuertz originally recommended the operation for lower-lobe tuberculosis, while Oehlecker, Sauerbruch, Lange and Walter consider it valueless performed alone but important as an aid in thoracoplasty and as a test operation. It is believed that phrenicotomy with the improved technique is a valuable adjunct to the surgical treatment of tuberculosis, and its simplicity and relative lack of danger will encourage its use still further.—*Die Phrenicotomie, Schulte-Tigges, Centralbl. f. d. ges. Tuberk.-Forsch., 1924, xxii, 225.*—(*H. J. C.*)

Artificial Pneumothorax and Phrenicotomy.—Recently it has been claimed that phrenicotomy should be done in all cases of artificial pneumothorax. But this is dangerous. There are certain indications for the operation, as for instance, in cases in which adhesions or thickened pleura invalidate pneumothorax. The operation permanently impairs the respiratory function of the side operated upon and this throws increased work upon the opposite lung. Should this side become diseased, the situation would become bad. Pneumothorax on the second side was impossible in two cases reported because of respiratory distress.—*Pneumothorax und Ph enikusexairese, Unverricht, Deutsche med. Wchnschr., February 20, 1925, li, 314.*—(*H. S. W.*)

Artificial Pneumothorax in Pulmonary Tuberculosis.—The use of large amounts of gas and high pressures in artificial pneumothorax is deplored. Two cases are reported with involvement of both sides in which one side was improving under general treatment and by means of low-pressure pneumothorax satisfactory results were obtained. The better side is also protected by the low-pressure treatment in bilateral involvement.—*Beitrag zur Klinik der Pneumothoraxbehandlung der Lungentuberkulose, L. Kogan, Ztschr. f. Tuberk., 1925, xl, 431.*—(*H. J. C.*)

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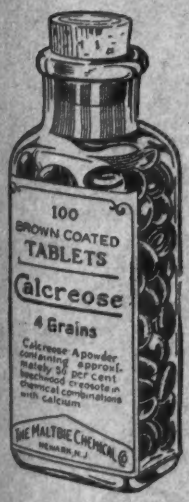

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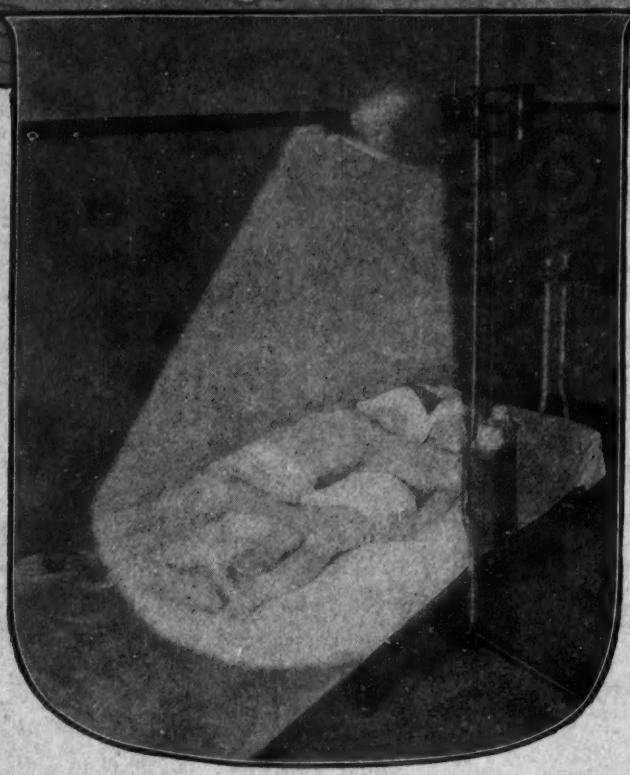

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INDEX OF ABSTRACTS OF TUBERCULOSIS

Abdominal reflex in tuberculosis, 65
Abscess, Diagnosis of migratory tuberculous, by lipiodol, 66
—— of rib, Tuberculous, invading interlobar fissure, 82
——, Tuberculous, of interlobar origin in chest-wall, 83
——, ——, —— thorax, Extensive extirpation of large, 83
Abscesses, cold, Lipiodol injections of, 88
Absorption of tubercle bacilli in intestinal tract, Mechanism of, 48
Acid-fast bacilli, nonpathogenic, Complement fixation with antigens from, 72
—— bacteria, Resistance of, to antiformin, 47
—— saprophytes, Complement fixation with antigens from, 73
Actinotherapy in surgical tuberculosis, Heliotherapy and, 115
Action of extracts of tubercle bacilli, 56
—— —— formaldehyde and heat on old tuberculin, 59
—— —— tuberculin, 58
——, tuberculin, Theory of, 59
Active tuberculosis, diagnosis of, Serological, 70
—— —— in children, Fornet's serum diagnosis of, 20
Activity, Lipolytic, of blood serum in tuberculosis of children, 25
Addison's disease, 104
Adenitis, cervical, tuberculous, treatment of, Radiotherapy in, 119
——, tuberculous, Generalized, 77
Adenomatous prostate, Tuberculosis in, 103
Adenopathies, Chronic nontuberculous tracheobronchial, in children, 23
Adenopathy, tracheobronchial, Nontuberculous, 82
——, ——, Tuberculous, as cause of anorexia, 81
Adhesions, Pleural, in tuberculosis in children, 23
Adrenals, Experimental tuberculosis of, in guinea pigs, 53
Adults, pulmonary tuberculosis in, Classifications of, 3
Aerocele in case of laryngeal tuberculosis, Laryngocele and, 79
Africa, Tuberculosis in, 12
Aged, Tuberculosis in, 6
Agents, physical, Tuberculosis and, 107
Agglutination reactions, Flocculation and, 76
Albee operation in tuberculous spondylitis, Late results of, 92
Alcoholic extracts of tubercle bacilli, Specific substances in, 60
Alizarin sputum test, 73
Allergic tuberculous peritonitis, exudate from, Effect of, 53
Allergy and immunity from dead and cold-blooded tubercle bacilli, 57
—— from dead tubercle bacilli, 56, 57
—— in tuberculosis, Influence of scurvy on, 5
——, Production of, by fluid from tuberculous guinea pigs, 53
Altitude, high, sanatorium treatment at, Disappearance of elastic fibres from sputum during, 110
Alton, Morland clinics at, 111
Amebic dysentery, Intestinal tuberculosis secondary to, 85
Amelung, W., and Hecker, H. v. Hematogenous dissemination in pulmonary tuberculosis, 36
Anatomical effects of artificial pneumothorax, 43, 44
Anatomy of chest, 32
Anesthesia, Local, in tuberculous, 6
Angiokeratoma, Relation of, to tuberculosis, 100
Animals, immunity to tuberculosis in, Production of, 54
Anorexia, Tuberculous tracheobronchial adenopathy as cause of, 81

Antagonism of infrared and ultraviolet rays, Biological, 118
Antelawa, N. Treatment of tuberculosis of hip, 93
Antiformin, Resistance of acid-fast bacteria to, 47
Antigens from acid-fast saprophytes, Complement fixation with, 73
—— —— nonpathogenic acid-fast bacilli, Complement fixation with, 72
Antituberculosis campaign in England, 8
—— ——, Influence of, on tuberculosis mortality, 7
—— measures, Belgian, 9
Antwerp section of Belgian Antituberculosis League, Scientific meeting of, 12
Aorta, perforation of, Tuberculous, 82
Aoyama, K. Experimental chronic tuberculosis in rabbits, 52
Apices, Artificial lighting of, in X-ray diagnosis of pulmonary tuberculosis, 69
Applied pathology of pulmonary tuberculosis, 44
Arc, electric, and mercury lamps, General phototherapy with, 115
Archibald, E. Surgical treatment of pulmonary tuberculosis, 122
Armand-Delille, P., Levy, R., and Marie, J. Pulmonary sclerosis following tuberculous splenopneumonia in infancy, 24
Army recruits, Pulmonary tuberculosis in, 5
Arnould, E. Conjugal tuberculosis, 16
Arsenic, pentavalent, Treatment of diarrhea in tuberculosis with, 85
Arterial blood, Oxygen content of, in pulmonary tuberculosis and in artificial pneumothorax, 41
Arthrodesis from sacroiliac tuberculosis, 92
Artificial heliotherapy, Principles of, 112
—— light baths, 115
—— —— clinic, Organization of, 116
—— ——, Influence of sunlight and, on health, 114
—— lighting of apices in X-ray diagnosis of pulmonary tuberculosis, 69
Artificial pneumothorax, Anatomical effects of, 43, 44
—— —— and phrenicotomy, 128
—— —— in infant, 28
—— —— —— pulmonary tuberculosis, 128
Artificial pneumothorax, Oxygen content of arterial blood in pulmonary tuberculosis, and in, 41
—— ——, Pleurisy in, 44
Artificial sunlight in treatment of internal tuberculosis in Japan, 116
Asado, T., and Ito, K. Treatment of tuberculosis of joints in Japan, 89
Aurophos, Treatment of lupus erythematosus with, 98
Autoreinfection of tuberculous guinea pigs, 53
Avian tuberculosis, Tuberculin test for, 30
Axmann. Treatment of lupus with pyotropin, 99

Babonneix, L., and Levy, M. Tuberculosis of cerebrum, 94
——, Pollet and Lévy. Encysted pleurisy simulating hydatid cyst, 80
Bacilli, acid-fast, nonpathogenic, Complement fixation with antigens from, 72
Bacilli, tubercle, Classification of, 46
——, ——, dead, Allergy from, 56, 57
——, ——, —— and cold-blooded, Allergy and immunity from, 57
——, ——, ——, Immunity to tuberculosis from, 57
——, ——, ——, Immunization with, 57
——, ——, Effect of old tuberculin and, on experimental tuberculosis, 52
——, ——, Egg-yolk medium for, 48
——, ——, extracts of, Action of, 56
——, ——, growth of, Influence of hydrogen-ion concentration of media on, 47
——, ——, human and bovine, Chickens and pigeons resistant to, 30
——, ——, Hypersensitive tests with watery extracts of, 56
——, ——, in bone-marrow, 47
——, ——, —— intestinal tract, Mechanism of absorption of, 48
——, ——, —— sputum, New staining method for, 73
——, ——, —— stools of children, Diagnostic value of, 21
——, ——, isolating, New method for, 47
——, ——, Isolation of, 47
——, ——, —— ——, by Petroff's method, 47

Bacilli, tubercle, modified strain of, Yabe's, 48
——, ——, Rate of dissemination of, in normal and immune guinea pigs, 52
——, ——, Specific substances in alcoholic extract of, 60
——, ——, Spread of, in body, 17
Bacillus, subtilis, Pathogenic, in tuberculosis, 106
Bacillus, tubercle, and man, Symbiosis of, 48
Bacteria, acid-fast, Resistance of, to antiformin, 47
Bacveyron. Action of formaldehyde and heat on old tuberculin, 59
Badolle and Cotte. Lipiodol injections of cold abscesses, 88
Balance, water, Tuberculin reaction and, 60
Bardswell, N. D. Results of sanatorium treatment, 109
Barnett, J. B. Heliotherapy of surgical tuberculosis, 87
Barney, J. D., and Jones, S. G. Frequency of bilateral renal tuberculosis, 101
Barsony, T., and Hollo, J. Treatment of dry tuberculous pleurisy, 79
Bartholin's gland, tuberculosis of, Primary, 104
Base of lungs in Children, Fibrosis at, 24
Baths, light, Artificial, 115
Bawls, W. B. Primary tuberculous pericarditis, 82
Beck, P. Treatment of surgical tuberculosis with yatren, 88
Beekmann, A. Flocculation and red-cell sedimentation tests, 76
Beitzke, H. Spread of tubercle bacilli in body, 17
Belgian, Antituberculosis League, Antwerp section of, Scientific meeting of, 12
—— —— measures, 9
—— National Antituberculosis League, Report of, for 1923, 11
Bell, A. J. Pulmonary tuberculosis in children, 19
Bérard. Thoracectomy in pulmonary tuberculosis, 125
Bergeron, A., and Letulle, R. Clinical laboratory technique applicable to tuberculosis, 69
Bernard, L. Prophylaxis of tuberculosis in infancy and childhood, 25
Bernard, L., Salomon and Valtin. Complement fixation in tuberculosis, 71
——, Salomon and Thomas. Treatment of diarrhea in tuberculosis with pentavalent arsenic, 85
Bezançon, F., and Letulle, M. Caseous pneumonia, 33
Bieling, R. Action of tuberculin, 58
——. Scurvy and tuberculosis, 53, 54
Bilateral renal tuberculosis, Frequency of, 101
Biological antagonism of infrared and ultraviolet rays, 118
Bissel, F. S. Differential diagnosis of chronic pulmonary lesions, 66
Bizard, Patoir and Delannoy. Tuberculosis of hernial sac, 86
Bladder, tuberculosis of, Origin of, 101
Blanc and Marion. Treatment of tuberculous cystitis with methylene blue, 102
Blood, arterial, Oxygen content of, in pulmonary tuberculosis and in artificial pneumothorax, 41
—— chemistry and ultraviolet rays, 118
—— serum in tuberculosis, Refractometric and viscosimetric examinations of, 76
—— ——, Lipolytic activity of, in tuberculosis of children, 25
—— ——, Toxicity of, after surgical treatment of pulmonary tuberculosis, 124
Blümel, K. H. Tuberculosis and family physician, 6
Bochalli. Red-cell sedimentation test, 75
Body, Spread of tubercle bacilli in, 17
Bogdanow, A. Abdominal reflex in tuberculosis, 65
——, ——., and Golemanow, A. Artificial lighting of apices in X-ray diagnosis of pulmonary tuberculosis, 69
Böhlau, H., and Wichels, P. Laryngocele and aerocele in case of laryngeal tuberculosis, 79
Bone and joint tuberculosis, Periarterial sympathectomy in, 89
Bone-marrow, Tubercle bacilli in, 47
Bones, tuberculosis of, Multiple, 89
——, tuberculosis of, treatment of, X-ray, 89
Bonnamour and Doubron. Anatomical effects of artificial pneumothorax, 44
Botello's and other reactions in tuberculosis, 75

Bovie, W. T. Effect of sunlight on growth and development, 111
Bovine tubercle bacilli, human and, Chickens and pigeons resistant to, 30
Braeuning. Types of pulmonary tuberculosis, 31
Breast, Tuberculosis of, 82
Breckoff, E. Incubation period of tuberculosis in children, 19
Brief, J. Paralysis due to tuberculosis of skull, 94
Brocq-Rousseu, Cauchemez and Urbain. Effect of strychnine and chloroform on tuberculosis complement fixation, 73
Bronchial movements, X-ray studies on, 32
—— tuberculosis in war-gassed patient, Predominantly, 35
Broughton-Alcock, W., Douglas, M., and Lucey, H. C. Complement fixation in tuberculosis, 70
Brünecke, J. Flocculation and agglutination reactions, 76
Brüning, A. Treatment of tuberculous spondylitis, 91
Bundle, vascular, of spermatic cord, Tuberculosis of, 102
Burill and Fraikin. Treatment of tuberculosis of olecranon with ultraviolet light, 90
Burnand, R. Chronic miliary tuberculosis of lungs, 105

Cabot, R. C., and Dodge, H. F. Frequency characteristics of lung sounds, 64
Calcium-chloride treatment of surgical tuberculosis, 87
Callenberg, J. Treatment of lupus with pyotropin, 99
Calvé, J. Localized nontuberculous affection of spine, 1
Camino, A. Pulmonary tuberculosis and extrapulmonary localizations, 87
Campaign, Antituberculosis, in England, 8
——, ——, Influence of, on tuberculosis mortality, 7
Campani, A. Cutaneous route of infection in pulmonary tuberculosis, 18
Carling, E. R., and Hicks, J. A. B. Tuberculous splenomegaly, 87
Caseous pneumonia, 33
Cathala, Lelong and Lereboullet. Nontuberculous spontaneous pneumothorax in infant, 29
Cathelin. Origin of tuberculosis of bladder, 101
Cattle, Ophthalmic tests on, 30
——, —— —— with phymatin in, 30
——, tuberculosis in, diagnosis of, Complement fixation for, 31
Cauchemez, Urbain and Brocq-Rousseu. Effect of strychnine and chloroform on tuberculosis complement fixation, 73
Cause of anorexia, Tuberculous tracheobronchial adenopathy as, 81
—— —— renal tuberculosis, 100
Causes of error in study of tuberculin reaction, 74
Cavities, pulmonary, Diagnosis and prognosis of, 66
Cells, Epithelioid, of tuberculous lesions, 38
——, ——, Transformation of leucocytes into, 37
——, phagocytic, of lung, Origin of, 36
Cerebellar tuberculoma in infant, Solitary, 29
Cerebrum, Tuberculosis of, 94
Cervical adenitis, tuberculous, treatment of, Radiotherapy in, 119
Chandler, F. G., and Preston, T. W. Pulmonary tuberculosis in children, 19
Changes, Intrathoracic, from heavy radiations with X-rays, 43
Characteristics, Frequency, of lung sounds, 64
Chaumet, G., and Rieux, J. Pulmonary tuberculosis in army recruits, 5
Chemistry, Blood, and ultraviolet rays, 118
Chest, Anatomy of, 32
—— examination, Fallacies in, 63
——, normal, X-ray of, 69
—— roentgenograms, Method of perfecting, 68
——, Shape of, of tuberculous and healthy Japanese, 32
—— surgery, Development of, in last twenty years, 120
Chest-wall, Tuberculous abscess of interlobar origin in, 83
Chiasm, optic, Tuberculosis affecting, 94
Chickens and pigeons resistant to human and bovine tubercle bacilli, 30

Child, tuberculous meningitis in, Unusual case of, 28
Childhood, Prophylaxis of tuberculosis in infancy and, 25
Children, Chronic nontuberculous tracheobronchial adenopathies in, 23
——, Erythema nodosum in, 22
——, exposed, tuberculous pulmonary infection in, X-ray evidence of, 20
——, Fibrosis at base of lungs in, 24
——, joint tuberculosis in, Treatment of, 28
—— of tuberculous parents, Physique of, 20
——, Percussion of lungs in, 20
——, Phlyctenules in, 22
——, Primary tuberculous foci in infants and, 19
——, treatment of tuberculosis in, X-ray, 21
——, tubercle bacilli in stools of, Diagnostic value of, 21
——, Tuberculosis in, 18
——, —— ——, active, Fornet's serum diagnosis of, 20
——, —— ——, Hilum, 23
——, —— ——, Immunity and prophylaxis in, 28
——, —— ——, Incubation period of, 19
——, —— ——, Pleural adhesions in, 23
——, —— ——, Pulmonary, 19
——, —— ——, X-ray treatment of, 21
——, —— of hip in, 93
——, —— —— infants and, 18
——, —— ——, Leucocytes in, 25
——, —— ——, Lipolytic activity of blood serum in, 25
——, —— —— middle ear and larynx in, 78
Chloramine, Treatment of lupus with, 99
Chloroform, Effect of strychnine and, on tuberculosis complement fixation, 73
Chondritis, Tuberculous, 89
Chronic icterus from tuberculous lymph nodes of hepatic pedicle, 84
—— miliary tuberculosis of lungs, 105
—— nontuberculous tracheobronchial adenopathies in children, 23
—— pulmonary lesions, Differential diagnosis of, 66
—— pulmonary tuberculosis, Classification of, 3
—— —— ——, sudden onset in, Frequency of, 62
Chronic tuberculosis in rabbits, Experimental, 52
Citrate, Sodium, in pleural effusions, 79
Classification of chronic pulmonary tuberculosis, 3
—— —— pulmonary tuberculosis, 2
—— —— tubercle bacilli, 46
——, Turban's, Remarks on, 4
Classifications of pulmonary tuberculosis in adults, 3
Clinic, artificial light, Organization of, 116
Clinical diagnosis of pulmonary tuberculosis, X-ray and, 68
—— importance of vital capacity in lung conditions, 45
—— laboratory technique applicable to tuberculosis, 69
—— significance of tuberculin hypersensitiveness, 55
—— study of pulmonary lesions, X-ray and, 68
Clinics, Morland, at Alton, 111
Coe, H. Tuberculosis of hip in children, 93
Cold abscesses, Lipiodol injections of, 88
Cold-blooded tubercle bacilli, Allergy and immunity from dead and, 57
Collapse therapy in pulmonary tuberculosis, 119
Colon, Tuberculous polyadenomatosis of, 2
Colonies, Tuberculosis, 7
Colonna, P. C. Treatment of joint tuberculosis in children, 28
Combined tuberculin and red-cell sedimentation test, 75
Complement fixation for diagnosis of tuberculosis in cattle, 31
—— —— in tuberculosis, 70, 71, 72
—— ——, tuberculosis, Effect of strychnine and chloroform on, 73
—— —— with antigens from acid-fast saprophytes, 73
—— —— —— —— —— nonpathogenic acid-fast bacilli, 72
Complicated by erythema centrifugum, Lupus erythematosus, 97
Conjugal tuberculosis, 16
Control, Tuberculosis, in England, 9
Cord, spermatic, Tuberculosis of vascular bundle of, 102

Cordey, F., and Philibert, A. Experimental tuberculous reinfection of rabbit, 49, 50
Correlations between lungs and heart, Functional, 40
Cotte and Badolle. Lipiodol injections of cold abscesses, 88
Couput, Delherm and Morel-Kahn. Treatment of tuberculous peritonitis with ultraviolet light, 86
Courboules. Extensive extirpation of large tuberculous abscess of thorax, 83
Coyon and Marty. Sodium citrate in pleural effusions, 79
Criep, L. H., and Narr, F. C. Generalized tuberculous adenitis, 77
Cummins, S. L. Hilum infection in tuberculosis, 14
Cumston, C. G. Influence of pulmonary tuberculosis on evolution of pregnancy, 1
Cutaneous route of infection in pulmonary tuberculosis, 18
Cyst, hydatid, Encysted pleurisy simulating, 80
Cystitis, tuberculous, Treatment of, with methylene blue, 102

Daranyi flocculation reaction, 76
Darget and Guérin. Tuberculosis of vascular bundle of spermatic cord, 102
Date, B. Tuberculosis of upper respiratory tract, 79
Davis, F. A. Blood chemistry and ultraviolet rays, 118
Dead and cold-blooded tubercle bacilli, Allergy and immunity from, 57
Dead tubercle bacilli, Allergy from, 56, 57
—— —— ——, Immunity to tuberculosis from, 57
—— —— ——, Immunization with, 57
Debray, J., and Ribadeau-Dumas, L. Tuberculous tracheobronchial adenopathy as cause of anorexia, 81
Debré. Causes of error in study of tuberculin reaction, 74
——, Duhem and Petot. Non-tuberculous tracheobronchial adenopathy, 82
——, R., and Lelong, M. Different aspects of heredity in tuberculosis, 39
——, ——., —— ——, ——. Heredity in tuberculosis, 13
DeCraeme, E. Psychology and Mental troubles of tuberculous, 61
Dehoff, E. Studies on tuberculosis mortality, 7
Delannoy, Bizard and Patoir. Tuberculosis of hernial sac, 86
Delherm, Morel-Kahn and Couput. Treatment of tuberculous peritonitis with ultraviolet light, 86
Delore, Roque, and Morenas. Intestinal tuberculosis secondary to amebic dysentery, 85
Denet-Kravitz. Antituberculosis campaign in England, 8
Denk, W. Operative treatment of tuberculous spondylitis, 92
——, ——. Surgical treatment of pulmonary tuberculosis, 123
Development, Effect of sunlight on growth and, 111
—— of chest surgery in last twenty years, 120
Diagnosis and prognosis of pulmonary cavities, 66
——, Differential, of chronic pulmonary lesions, 66
——, ——, —— tuberculosis of tendon sheaths of hand, 90
——, Fornet's serum, of active tuberculosis in children, 20
—— of active tuberculosis, Serological, 70
—— —— migratory tuberculous abscess by lipiodol, 66
—— —— pulmonary tuberculosis, Value of physical findings in, 64
—— —— —— ——, X-ray and clinical, 68
—— —— —— ——, ——, Artificial lighting of apices in, 69
—— —— tuberculosis in cattle, Complement fixation for, 31
—— —— —— —— tropics, 65
—— —— tuberculous spondylitis, 91
Diagnostic pneumothorax, 66
—— value of tubercle bacilli in stools of children, 21
Diarrhea in tuberculosis, Treatment of, with pentavalent arsenic, 85
Dienes, L., and Schoenheit, E. W. Specific substances in alcoholic extracts of tubercle bacilli, 60
Diet in pulmonary tuberculosis, 108

Dieterich, H. Differential diagnosis of tuberculosis of tendon sheaths of hand, 90
Dietetic treatment of tuberculosis, 108
Different aspects of heredity in tuberculosis, 39
Differential diagnosis of chronic pulmonary lesions, 66
—— —— —— tuberculosis of tendon sheaths of hand, 90
Disappearance of elastic fibres from sputum during sanatorium treatment at high altitude, 110
Disease, Addison's, 104
Dislocation, Spontaneous, from early tuberculosis of hip-joint, 93
Dissemination, Hematogenous, in pulmonary tuberculosis, 36
—— of tubercle bacilli in normal and immune guinea pigs, Rate of, 52
Distention of heart on inspiration, and socalled pulsus paradoxus, 39
Dodge, H. F., and Cabot, R. C. Frequency characteristics of lung sounds, 64
Dold, H. Homogenization of sputum with urea, 74
Dölter, W. Complement fixation in tuberculosis, 72
Dosage of ultraviolet rays, 117
Doubron and Bonnamour. Anatomical effects of artificial pneumothorax, 44
Douglas, M., Lucey, H. C., and Broughton-Alcock, W. Complement fixation in tuberculosis, 70
Drugs, Treatment of lupus with pyotropin and other, 98
Dry tuberculous pleurisy, treatment of, X-ray, 79
Dudan, A. Frequency of sudden onset in chronic pulmonary tuberculosis, 62
Duhem, P., and Séguin, P. Mediastinal pleurisy, 80
——, Petot and Debré. Nontuberculous tracheobronchial adenopathy, 82
Dujarier. Tuberculous chondritis, 89
Dultz, G. Ophthalmic tests with phymatin in cattle, 30
Dunet. Tuberculous abscess of interlobar origin in chest-wall, 83
Dunham, K., and Skavlem, J. H. Applied pathology of pulmonary tuberculosis, 44
Duodenum, Tuberculosis of, 84
Duration of sanatorium treatment, 110
Dysentery, amebic, Intestinal tuberculosis secondary to, 85

Ear, middle, and larynx, Tuberculosis of, in children, 78
Early pulmonary tuberculosis, Pathognomonic X-ray finding in, 68
—— treatment in pulmonary tuberculosis, Importance of, 106
—— tuberculosis of hip-joint, Spontaneous dislocation from, 93
Economic condition, Tuberculosis mortality and, 17
Effect of exudate from allergic tuberculous peritonitis, 53
—— —— old tuberculin and tubercle bacilli on experimental tuberculosis, 52
—— —— strychnine and chloroform on tuberculosis complement fixation, 73
—— —— sunlight on growth and development, 111
Effects of artificial pneumothorax, Anatomical, 43, 44
Effusions, Pleural, in X-ray, 43
——, ——, Sodium citrate in, 79
Egg-yolk medium for tubercle bacilli, 48
Eidinow, A. Dosage of ultraviolet rays, 117
——, ——. Principles of artificial heliotherapy, 112
Ektebin treatment, Leucocytes after, 39
Elastic fibres, Disappearance of, from sputum during sanatorium treatment at high altitude, 110
Electric arc and mercury lamps, General phototherapy with, 115
Embryology and histology of lung and pleura, 32
Encysted pleurisy simulating hydatid cyst, 80
England, Antituberculosis campaign in, 8
——, Tuberculosis control in, 9
Epithelioid cells of tuberculous lesions, 38
—— ——, Transformation of leucocytes into, 37
Error in study of tuberculin reaction, Causes of, 74
Erythema centrifugum, Lupus erythematosus complicated by, 97
Erythema nodosum in children, 22

Erythema nodosum, Significance of, 99
Esophagus, Tuberculosis of, 84
Esser, A. Solitary tuberculosis of spleen, 87
Etiology of lupus erythematosus, 97
Evans, W. A., and Leuceutia, T. Intrathoracic changes from heavy radiations with X-rays, 43
Evolution of pregnancy, Influence of pulmonary tuberculosis on, 1
Examination, chest, Fallacies in, 63
Examinations, Refractometric and viscosimetric, of the blood serum in tuberculosis, 76
Exercise in treatment of tuberculosis, 108
Experimental chronic tuberculosis in rabbits, 52
—— tuberculosis, Effect of old tuberculin and tubercle bacilli on, 52
—— —— of adrenals in guinea pigs, 53
—— tuberculous reinfection of rabbit, 49, 50
Exposed children, tuberculous pulmonary infection in, X-ray evidence of, 20
Extensive extirpation of large tuberculous abscess of thorax, 83
Extirpation of large tuberculous abscess of thorax, Extensive, 83
Extracts, alcoholic, of tubercle bacilli, Specific substances in, 60
—— of tubercle bacilli, Action of, 56
——, watery, of tubercle bacilli, Hypersensitive tests with, 56
Extrapleural thoracoplasty in pulmonary tuberculosis, 126, 127
Extrapulmonary localizations, Pulmonary tuberculosis and, 87
Exudate from allergic tuberculous peritonitis, Effect of, 53
Eye, Tuberculosis of, 77

Factors in prognosis of tuberculosis in infants, 29
Fallacies in chest examination, 63
Family physician, Tuberculosis and, 6
Fansler, W. A. Tuberculosis and fistula-in-ano, 86
Farr, R. E. Local anesthesia in tuberculous, 6
Farrell, B. P. Fusion of tuberculous hip-joint, 93
Fatal hemoptysis due to nodose periarteritis of lungs, 79
Fate of tuberculin in rabbits, 60
Feiling, A. Tuberculosis of nervous system, 95
Female peritoneal and genital tuberculosis, treatment of, X-ray, 103
Ferran's ideas of tuberculous infection, 49
Fibres, elastic, Disappearance of, from sputum during sanatorium treatment at high altitude, 110
Fibrosis at base of lungs in children, 24
——, pulmonary, Occupational, 35
Finding, X-ray, Pathognomonic, in early pulmonary tuberculosis, 68
Findings, physical, Value of, in diagnosis of pulmonary tuberculosis, 64
Firemen, Minneapolis, Vital capacity of, 45
Fissure, interlobar, Tuberculous abscess of rib invading, 82
Flocculation and agglutination reactions, 76
—— —— red-cell sedimentation tests, 76
—— reaction, Daranyi, 76
Fluid from tuberculous guinea pigs, Production of allergy by, 53
Foci, Primary tuberculous, in infants and children, 19
Focus, primary tuberculous, Location of, 31
Formaldehyde and heat, Action of, on old tuberculin, 59
Fornet's serum diagnosis of active tuberculosis in children, 20
Forssner, H., Sundell, C., and Kjellin, G. Pregnancy and tuberculosis, 14
Förtig, H. Complement fixation in tuberculosis, 71
Fowler, J. K. Tuberculosis in tropics, 12
Fowler, W. C. Duration of sanatorium treatment, 110
Fraikin and Burill. Treatment of tuberculosis of olecranon with ultraviolet light, 90
François, F. General phototherapy with electric arc and mercury lamps, 115
Frequency characteristics of lung sounds, 64
—— of bilateral renal tuberculosis, 101
—— —— sudden onset in chronic pulmonary tuberculosis, 62
Freudenberg, K., and Wolff, G. Tuberculosis mortality and economic condition, 17

Friedman, E., and Hawes, J. B., 2nd. Tuberculosis of tracheobronchial lymph nodes, 80
von Friedrich, W. Treatment of tuberculosis of tracheobronchial lymph nodes, 81
Frisch, A. V. Influence of serum on tuberculin reaction, 59
——, ——. ——., and Braun, J. Tuberculin reaction and water balance, 60
——, ——. ——., —— Silberstern, E. Fate of tuberculin in rabbits, 60
——, ——. ——., —— ——, ——. Influence of serum on tuberculin reaction, 59
Functional correlations between lungs and heart, 40
Fusion of tuberculous hip-joint, 93

Gamble, R. C., and Gamble, W. E. Tuberculosis affecting optic chiasm, 94
Gamble, W. E., and Gamble, R. C. Tuberculosis affecting optic chiasm, 94
Gänsslen, M., and Maier, O. Refractometric and viscosimetric examinations in blood serum of tuberculosis, 76
Gardère and Lacroix. Artificial pneumothorax in infant, 28
Gauvain, H. Morland clinics at Alton, 111
——, ——. Organization of artificial light clinic, 116
Gayet, Pérard and Speder. Tuberculous abscess of rib invading interlobar fissure, 82
Geissler, O. School teachers with open tuberculosis, 17
Geldmacher, M. Value of urochromogen reaction in surgical tuberculosis, 88
General phototherapy with electric arc and mercury lamps, 115
Generalized tuberculous adenitis, 77
Genital tuberculosis, female peritoneal and, treatment of, X-ray, 103
—— ——, male, Orchidectomy in, 102
—— ——, ——, Origin and spread of, 102
Geschke and Selter. Allergy and immunity from dead and cold-blooded tubercle bacilli, 57
Ghon, A., and Winternitz, F. Primary tuberculous foci in infants and children, 19
Gibson, C. B. Sanatorium treatment of juvenile tuberculosis, 109
Ginesty. Tuberculous chondritis, 89
Gland, Bartholin's, tuberculosis of, Primary, 104
Gleich, M. Solitary cerebellar tuberculoma in infant, 29
Gloyne, S. R. Embryology and histology of lung and pleura, 32
Gödde, H. Valvular heart disease and pulmonary tuberculosis, 17
Golemanow, A., and Bogdanow, A. Artificial lighting of apices in X-ray diagnosis of pulmonary tuberculosis, 69
Gordon, J. W. Primary tuberculosis of Bartholin's gland, 104
Gougerot. Tuberculosis of mouth, 83
Goulden, C. Tuberculosis of eye, 77
Graf, W. Toxicity of blood serum after surgical treatment of pulmonary tuberculosis, 124
Grass, H. Modified Pirquet test, 74
Grau, H. Diagnosis and prognosis of pulmonary cavities, 66
——, ——. So called latent period of pulmonary tuberculosis, 63
Griffith, A. S. Classification of tubercle bacilli, 46
Growth and development, Effect of sunlight on, 119
—— of tubercle bacilli, Influence of hydrogen-ion concentration of media on, 47
Guérin and Darget. Tuberculosis of vascular bundle of spermatic cord, 102
Guilleminet, M., and Madinier, J. Surgical treatment of pulmonary tuberculosis, 120
Guinea pigs, Autoreinfection of tuberculous, 53
—— ——, Experimental tuberculosis of adrenals in, 53
—— ——, Rate of dissemination of tubercle bacilli in normal and immune, 52
—— ——, tuberculosis in, Influence of vitamines on, 54
—— ——, tuberculous, fluid from, Production of allergy by, 53
Guinon, L., and Levesque, J. Chronic non-tuberculous tracheobronchial adenopathies in children, 23

Güterbock, R. Tuberculosis control in England, 9
v. Gutfield, F., and Seligmann, E. Immunization with dead tubercle bacilli, 57

Hackenthal, H., and Schilling, C. Hypersensitive tests with watery extracts of tubercle bacilli, 56
Hagen, W. Predisposition to tuberculosis, 14
Hand, tuberculosis of tendon sheaths of, Differential diagnosis of, 90
Hartoch, O., Lusena, M., Prigge, R., and Schlossberger, H. Complement fixation in tuberculosis, 71
Hasegawa, U. Shape of chest of tuberculous and healthy Japanese, 32
Hawes, J. B., 2nd., and Friedman, E. Tuberculosis of tracheobronchial lymph nodes, 80
Hayes, R. M., and Trostler, I. S. Pathognomonic X-ray finding in early pulmonary tuberculosis, 68
Healed miliary tuberculosis, 105
Health resort, Montana, Switzerland, as, 106
Healthy Japanese, Shape of chest of tuberculous and, 32
Heart disease, Valvular, and pulmonary tuberculosis, 17
——, Distention of, on inspiraton, and so called pulsus paradoxus, 39
——, Functional correlations between lungs and, 40
Heat, Action of formaldehyde and, on old tuberculin, 59
Heavy radiations with X-rays, Intrathoracic changes from, 43
Hebert, G. T. Fallacies in chest examination, 63
Hecker, H. v., and Amelung, W. Hematogenous dissemination in pulmonary tuberculosis, 36
Heinemann, M. Diagnosis of tuberculosis in tropics, 65
Heliotherapy and actinotherapy in surgical tuberculosis, 115
—— —— tuberculous spondylitis, 91
——, artificial, Principles of, 112
—— of surgical tuberculosis, 87
Hellmann, W. Fornet's serum diagnosis of active tuberculosis in children, 20
Helm. Remarks on Turban's classification, 4
Hematogenous dissemination in pulmonary tuberculosis, 36
Hemoptysis due to nodose periarteritis of lungs, Fatal, 79
—— in pulmonary tuberculosis, Significance of onset with, 62
Henschke, E., and Zwerg, H. Serum lipase in pulmonary tuberculosis, 61
Hepatic pedicle, Chronic icterus from tuberculous lymph nodes of, 84
Heredity in tuberculosis, 13
—— —— ——, Different aspects of, 39
Hernial sac, Tuberculosis of, 86
Hess, A. F. Ultraviolet rays of sunlight, 42
Hesse, F. Location of primary tuberculous focus, 31
Hibbs, R. A., and von Lackum, H. L. Tuberculosis of knee-joint, 93
Hicks, J. A. B., and Carling, E. R. Tuberculous splenomegaly, 87
High altitude, sanatorium treatment at, Disappearance of elastic fibres from sputum during, 110
Hilton. Oxygen content of arterial blood in pulmonary tuberculosis, and in artificial pneumothorax, 41
Hilum infection in tuberculosis, 14
—— tuberculosis in children, 23
Hip, Tuberculosis of, in children, 93
——, —— ——, treatment of, Surgical, 93
Hip-joint, tuberculosis of, early, Spontaneous dislocation from, 93
——, tuberculous, Fusion of, 93
Hirsch, C. Surgical treatment of laryngeal tuberculosis, 78
Histology of lung and pleura, Embryology and, 32
Hofbauer, L. Resorption factors in lung, 41
Hollo, J., and Barsony, T. Treatment of dry tuberculous pleurisy, 79
Homogenization of sputum with urea, 74
Homolateral pulmonary and laryngeal tuberculosis, 79
Hopkins, J. G., and Smith, M. K. Radiotherapy n treatment of tuberculous cervical adenitis, 119
Hudson, B. Surgical treatment of pulmonary tuberculosis, 123

Human and bovine tubercle bacilli, Chickens and pigeons resistant to, 30
Hume, J. B. Anatomy of chest, 32
Hydatid cyst, Encysted pleurisy simulating, 80
Hydroappendix, Ileo-cecal tuberculosis with, 85
Hydrogen-ion concentration of media, Influence of, on growth of tubercle bacilli, 47
Hypersensitive tests with watery extracts of tubercle bacilli, 56
Hypersensitiveness, Local, produced by tuberculin, 55
——, Tuberculin, and immunity to tuberculosis, 55
——, ——, Clinical significance of, 55

Iagnov. Classification of pulmonary tuberculosis, 2
Icterus from tuberculous lymph nodes of hepatic pedicle, Chronic, 84
Ileo-cecal tuberculosis with hydroappendix, 85
Immune guinea pigs, Rate of dissemination of tubercle bacilli in normal and, 52
Immunity and prophylaxis in tuberculosis in children, 28
—— from dead and cold-blooded tubercle bacilli, Allergy and, 57
—— in tuberculosis, Menstruation and, 1
—— to tuberculosis from dead tubercle bacilli, 57
—— —— —— in animals, Production of, 54
—— —— ——, Skin sensitiveness and, 55
Immunization and susceptibility to tuberculosis, 56
—— with dead tubercle bacilli, 57
Importance of early treatment in pulmonary tuberculosis, 106
—— —— vital capacity in lung conditions, Clinical, 45
Incubation period of tuberculosis in children, 19
Infancy and childhood, Prophylaxis of tuberculosis in, 25
——, Prognosis of tuberculosis in, 25
——, Pulmonary sclerosis following tuberculous splenopneumonia in, 24
——, tuberculosis in, Prognosis of, 25
Infant, Artificial pneumothorax in, 28
——, Solitary cerebellar tuberculoma in, 29
——, spontaneous pneumothorax in, Non-tuberculous, 29
Infants and children, Primary tuberculous foci in, 19
—— —— ——, Tuberculosis of, 18
——, tuberculosis in, prognosis of, Factors in, 29
——, —— of, treatment of, Sea voyages in, 111
Infection, Hilum, in tuberculosis, 14
—— in pulmonary tuberculosis, Cutaneous route of, 18
——, tuberculous, Ferran's ideas of, 49
Influence of antituberculosis campaign on tuberculosis mortality, 7
—— —— hydrogen-ion concentration of media on growth of tubercle bacilli, 47
—— —— pulmonary tuberculosis on evolution of pregnancy, 1
—— —— scurvy on allergy in tuberculosis, 54
—— —— serum on tuberculin, 60
—— —— —— —— —— reaction, 59
—— —— sunlight and artificial light on health, 114
—— —— thyroidectomy on tuberculosis, 53
—— —— vitamines on tuberculosis in guinea pigs, 54
Infrared and ultraviolet rays, Biological antagonism of, 118
Injections, Lipiodol, of cold abscesses, 88
Inoculation tuberculosis, Primary, of skin, 98
Inspiration, Distention of heart on, and so called pulsus paradoxus, 39
Intensity of light rays, 42
Interlobar fissure, Tuberculous abscess of rib invading, 82
—— origin, Tuberculous abscess of, in chest-wall, 83
Internal tuberculosis, treatment of, Artificial sunlight in, in Japan, 116
Intestinal tract, Mechanism of absorption of tubercle bacilli in, 48
—— tuberculosis secondary to amebic dysentery, 85
Intrathoracic changes from heavy radiations with X-rays, 43

Invading interlobar fissure, Tuberculous abscess of rib, 82
Ionization, Treatment of lupus by, 97
Isaacs, H. J. Diagnostic pneumothorax, 66
Ishiguro, S., and Kumagaya, K. Mechanism of absorption of tubercle bacilli in intestinal tract, 48
Ishimori, K. Influence of hydrogen-ion concentration on growth of tubercle bacilli, 47
Isolating tubercle bacilli, New method for, 47
Isolation of tubercle bacilli, 47
—— —— —— —— by Petroff's method, 47
Ito, H. Surgical treatment of pericostal tuberculosis, 83
Ito, K., and Asado, T. Treatment of tuberculosis of joints in Japan, 89
Itoh, M. Relation of angiokeratoma to tuberculosis, 100

Jacques. Perforating tuberculosis of vault of palate, 83
Japan, Artificial sunlight in treatment of internal tuberculosis in, 116
——, tuberculosis of joints in, Treatment of, 89
Japanese, Shape of chest of tuberculous and healthy, 32
Jean. Pleurisy of Mediastinum, 80
Jean, G. Chronic icterus from tuberculous lymph nodes of hepatic pedicle, 84
Jeandidier, A. Some aspects of tuberculosis in military life, 4
Jessen, H. Tuberculous stricture of rectum, 85
Joint tuberculosis, bone and, Periarterial sympathectomy in, 89
—— ——, Treatment of, in children, 28
Joints, tuberculosis of, Treatment of, in Japan, 89
Joly, J. S. Late results of renal tuberculosis, 100
Jones, S. G., and Barney, J. D. Frequency of bilateral renal tuberculosis, 101
Joress, M. H. Importance of early treatment in pulmonary tuberculosis, 106
Jülich, W. Leucopenia in tuberculosis, 38
Juvenile tuberculosis, treatment of, Sanatorium, 109

Kahn, M., and Sloan, M. F. X-ray and clinical study of pulmonary lesions, 68
Kalcher, H., and Sonnenfeld, A. Serological diagnosis of active tuberculosis, 70
Kamino, K., and Watanabe, S. Botello's and other reactions in tuberculosis, 75
Kawakami, R. Influence of thyroidectomy on tuberculosis, 53
Keller, W., and Moro, E. Skin sensitiveness due to tuberculin and vaccinia combined, 55
Kelynack, T. N., and Morland, A. Montana, Switzerland, as health resort, 106
Key points of lung structure, 32
Kiyokawa, W. Experimental tuberculosis of adrenals in guinea pigs, 53
Kjellin, G., Forssner, H., and Sundell, C. Pregnancy and tuberculosis, 14
Kluge, O. X-ray of lungs with new type of tube, 69
Knee, Resection of, in tuberculous osteoarthritis, 88
Knee-joint, Tuberculosis of, 93
Knopf, S. A. Psychology, psychopathology and psychotherapy in tuberculosis, 4
Kobayashi, K., Yabe, T., Shibata, M., and Kumagaya, K. Yabe's modified strain of tubercle bacilli, 48
Koch, K. Recovery from tuberculous meningitis, 95
Kogan, L. Artificial pneumothorax in pulmonary tuberculosis, 128
Kohgami, K. Red-cell sedimentation test, 75
Koide, T. Tuberculosis of stomach, 84
Koizumi, T. Tubercle bacilli in bone-marrow, 47
Köster, H., and Reiter, H. Complement fixation in tuberculosis, 72
Krause, A. K., and Willis, H. S. Rate of dissemination of tubercle bacilli in normal and immune guinea pigs, 52
Kreuser, F. Tuberculosis of infants and children, 18
Kropatsch, A. Treatment of lupus erythematosus with aurophos, 98
Kruchen, C. Daranyi flocculation reaction, 76
Kumagaya, K., and Ishiguro, S. Mechanism of absorption of tubercle bacilli in intestinal tract, 48

Kumagaya, K., Kobayashi, K., Yabe, T., and Shibata, M. Yabe's modified strain of tubercle bacilli, 48

Laboratory technique, Clinical, applicable to tuberculosis, 69
von Lackum, H. L., and Hibbs, R. A. Tuberculosis of knee-joint, 93
Lacroix and Gardère. Artificial pneumothorax in infant, 28
Lamps, electric arc and mercury, General phototherapy with, 115
Landon, J. F. Tuberculosis simulating lymphatic leukemia, 74
Lange, E. Clinical significance of tuberculin hypersensitiveness, 55
Lanzer, H. X-ray evidence of tuberculous pulmonary infection in exposed children, 20
Large tuberculous abscess of thorax, Extensive extirpation of, 83
Laryngeal tuberculosis, Homolateral pulmonary and, 79
—— ——, Laryngocele and aerocele in case of, 79
—— ——, treatment of, Surgical, 78
Laryngocele and aerocele in case of laryngeal tuberculosis, 79
Larynx, Tuberculosis of middle ear and, in children, 78
Late results of Albee operation in tuberculous spondylitis, 92
—— —— —— renal tuberculosis, 100
Latent period of pulmonary tuberculosis, Socalled, 63
Legueu and Verliac. Tuberculosis in adenomatous prostate, 103
Leichtentritt, B. Influence of vitamines on tuberculosis in guinea pigs, 54
Lelong, Lereboullet and Cathala. Nontuberculous spontaneous pneumothorax in infant, 29
——, M., and Debré, R. Different aspects of heredity in tuberculosis, 39
——, ——., —— ——, ——. Heredity in tuberculosis, 13
Lemaire, H. Factors in prognosis of tuberculosis in infants, 29
——, ——. Prognosis of tuberculosis in infancy, 25
Lereboullet, Cathala and Lelong. Nontuberculous spontaneous pneumothorax in infant, 29
Letulle, M., and Bezançon, F. Caseous pneumonia, 33
Letulle, R., and Bergeron, A. Clinical laboratory technique applicable to tuberculosis, 69
Leuceutia, T., and Evans, W. A. Intrathoracic changes from heavy radiations with X-rays, 43
Leucocytes after ektebin treatment, 39
—— in pulmonary tuberculosis, 37
—— —— tuberculosis of children, 25
——, Transformation of, into epithelioid cells, 37
Leucopenia in tuberculosis, 38
Leukemia, lymphatic, Tuberculosis simulating, 74
Levesque, J. Pleural adhesions in tuberculosis in children, 23
——, ——., and Guinon, L. Chronic nontuberculous tracheobronchial adenopathies in children, 23
Levick, G. M. Heliotherapy and actinotherapy in surgical tuberculosis, 115
Lévy, Babonneix and Pollet. Encysted pleurisy simulating hydatid cyst, 80
Levy, M., and Babonneix, L. Tuberculosis of cerebrum, 94
Levy, R., Marie, J., and Armand-Delille, P. Pulmonary sclerosis following tuberculous splenopneumonia in infancy, 24
Lewis, M. R. Origin of phagocytic cells of lung, 36
——, ——. ——., and Lewis, W. H. Transformation of leucocytes into epithelioid cells, 37
——, ——. ——., Willis, H. S., and Lewis, W. H. Epithelioid cells of tuberculous lesions, 38
Lewis, W. H., and Lewis, M. R. Transformation of leucocytes into epithelioid cells, 37
——, ——. ——., Lewis, M. R., and Willis, H. S. Epithelioid cells of tuberculous lesions, 38
Light, artificial, clinic, Organization of, 116
——, ——, Influence of sunlight and, on health, 114

Light baths, Artificial, 115
—— rays, Intensity of, 42
——, Therapeutic value of, 111
——, ultraviolet, Treatment of tuberculosis of olecranon with, 90
—— ——, —— —— tuberculous peritonitis with, 86
Lighting, Artificial, of apices in X-ray diagnosis of pulmonary tuberculosis, 69
Lipase, Serum, in pulmonary tuberculosis, 61
Lipiodol, Diagnosis of migratory tuberculous abscess by, 66
—— injections of cold abscesses, 88
Lipolytic activity of blood serum in tuberculosis of children, 25
Local anesthesia in tuberculous, 6
—— hypersensitiveness produced by tuberculin, 55
Localizations, extrapulmonary, Pulmonary tuberculosis and, 87
Localized nontuberculous affection of spine, 1
Location of primary tuberculous focus, 31
Löwenstein, E. Cause of renal tuberculosis, 100
——, ——. New method for isolating tubercle bacilli, 47
Löwenthal, K. Red-cell sedimentation test, 75
Lucey, H. C., Broughton-Alcock, W., and Douglas, M. Complement fixation in tuberculosis, 70
Lunde, N. Seasonal variations in weight of tuberculous patients, 65
Lung and pleura, Embryology and histology of, 32
—— conditions, vital capacity in, Clinical importance of, 45
——, phagocytic cells of, Origin of, 36
——, Resorption factors in, 41
——, Rest of, in treatment of pulmonary tuberculosis, 126
—— sounds, Frequency characteristics of, 64
—— splint, New, 108
—— structure, Key points of, 32
Lungs and heart, Functional correlations between, 40
——, Fibrosis at base of, in children, 24
——, nodose periarteritis of, Fatal hemoptysis due to, 79
——, Percussion of, in children, 20
Lungs, tuberculosis of, miliary, Chronic, 105
——, X-ray of, with new type of tube, 69
Lupus erythematosus complicated by erythema centrifugum, 97
—— ——, Etiology of, 97
—— ——, Treatment of, with aurophos, 98
Lupus, Treatment of, by ionization, 97
——, —— ——, with chloramine, 99
——, —— ——, —— pyotropin, 99
——, —— ——, —— —— and other drugs, 98
Lusena, M., Prigge, R., Schlossberger, H., and Hartoch, O. Complement fixation in tuberculosis, 71
Lymph nodes, tracheobronchial, Tuberculosis of, 23, 80
—— ——, ——, —— ——, Treatment of, 81
—— ——, tuberculous, of hepatic pedicle, Chronic icterus from, 84
Lymphatic leukemia, Tuberculosis simulating, 74
Lynham, J. E. A. X-ray in pulmonary tuberculosis, 67

Macklin, C. C. X-ray studies on bronchial movements, 32
Madinier, J., and Guilleminet, M. Surgical treatment of pulmonary tuberculosis, 120
Maeder, L. M. A., and Myers, J. A. Vital capacity of Minneapolis firemen, 45
Maier, O., and Gänsslen, M. Refractometric and viscosimetric examinations of blood serum in tuberculosis, 76
Male genital tuberculosis, Orchidectomy in, 102
—— —— ——, Origin and spread of, 102
Man, Symbiosis of tubercle bacillus and, 48
Marberger, A. Tuberculosis problems, 6
Marie, J., Armand-Delille, P., and Levy, R. Pulmonary sclerosis following tuberculous splenopneumonia in infancy, 24
Marion and Blanc. Treatment of tuberculous cystitis with methylene blue, 102
Martenstein, H. Treatment of lupus with chloramine, 99
Martin, A. Predominantly bronchial tuberculosis in war-gassed patient, 35
Marty and Coyon. Sodium citrate in pleural effusions, 79

Matéfy reaction in pulmonary tuberculosis, 76
Mau, C. Late results of Albee operation in tuberculous spondylitis, 92
Mayer, A. E. Homolateral pulmonary and laryngeal tuberculosis, 79
McCaslan, W. H. Unusual case of tuberculous meningitis in child, 28
McPhedran, F. M., and Weyl, C. N. Method of perfecting chest roentgenograms, 68
Measures, antituberculosis, Belgian, 9
Mechanism of absorption of tubercle bacilli in intestinal tract, 48
Media, hydrogen-ion concentration of, Influence of, on growth of tubercle bacilli, 47
Mediastinal pleurisy, 80
Mediastinum, Pleurisy of, 80
Medium, Egg-yolk, for tubercle bacilli, 48
Meier, I. B., and Seiffert, G. Complement fixation for diagnosis of tuberculosis in cattle, 31
Mende, I. Red-cell sedimentation test, 75
Meningitis, tuberculous, Recovery from, 95
——, ——, Tonic reflexes of neck in, 97
——, ——, Unusual case of, in child, 28
Menstruation and immunity in tuberculosis, 1
Mental troubles of tuberculous, Psychology and, 61
Menzies, F. N. K. Tuberculosis colonies, 7
Mercury lamps, General phototherapy with electric arc and, 115
Meriel. Tuberculosis of breast, 82
Method for isolating tubercle bacilli, New, 47
—— of perfecting chest roentgenograms, 68
——, Petroff's, Isolation of tubercle bacilli by, 47
——, staining, New, for tubercle bacilli in sputum, 73
Meunier, M. Significance of erythema nodosum, 99
Micklinghoff-Malten, B. Intensity of light rays, 42
Middle ear and larynx, Tuberculosis of, in children, 78
Middleton, W. S. Healed miliary tuberculosis, 105
Migratory tuberculous abscess, Diagnosis of, by lipiodol, 66
Mikulowski, W. Diagnostic value of tubercle bacilli in stools of children, 21
Miliary tuberculosis, Healed, 105
—— —— of lungs, Chronic, 105
Military life, tuberculosis in, Some aspects of, 4
Miller, W. S. Key points of lung structure, 32
Minneapolis firemen, Vital capacity of, 45
Modified Pirquet test, 74
—— strain of tubercle bacilli, Yabe's, 48
Montana, Switzerland, as health resort, 106
Moral, H., and Sarbadhikary, S. Tuberculin reaction, 58
Morel-Kahn, Couput and Delherm. Treatment of tuberculous peritonitis with ultraviolet light, 86
Morenas, Delore and Roque. Intestinal tuberculosis secondary to amebic dysentery, 85
Morland, A., and Kelynack, T. N. Montana, Switzerland, as health resort, 106
Morland clinics at Alton, 111
Moro, E., and Keller, W. Skin sensitiveness due to tuberculin and vaccinia combined, 55
Mortality, Tuberculosis, and economic condition, 17
——, ——, Influence of antituberculosis campaign, 7
——, ——, Studies on, 7
Mouth, Tuberculosis of, 83
Movements, bronchial, X-ray studies on, 32
Multiple tuberculosis of bones, 89
Münch. Spontaneous dislocation from early tuberculosis of hip joint, 93
Mündel, F. Leucocytes after ektebin treatment, 39
——, ——. —— in tuberculosis of children, 25
Muto, C. Tuberculosis of esophagus, 84
——, ——. —— —— stomach, 84
Myers, J. A., and Maeder, L. M. A. Vital capacity of Minneapolis firemen, 45
——, ——. ——., —— Rice, C. H. Clinical importance of vital capacity in lung conditions, 45
——, ——. ——., —— Shepard, W. P. Vital-capacity standards, 45

Nakahachi, F. Tuberculosis of middle ear and larynx in children, 78
Nakamura, K. Resistance of acid-fast bacteria to antiformin, 47
Nakayana, J. Allergy from dead tubercle bacilli, 56
Narr, F. C., and Criep, L. H. Generalized tuberculous adenitis, 77
Neck, reflexes of, Tonic, in tuberculous meningitis, 97
Nervous system, Tuberculosis of, 95
New lung splint, 108
—— method for isolating tubercle bacilli, 47
—— staining method for tubercle bacilli in sputum, 73
—— type of tube, X-ray of lungs with, 69
Newborn, Vaccination of, against tuberculosis, 27
Nicolesco, P. Sea voyages in treatment of tuberculosis of infants, 111
Nitschke, W. Production of allergy by fluid from tuberculous guinea pigs, 53
Nodose periarteritis of lungs, Fatal hemoptysis due to, 79
Nonpathogenic acid-fast bacilli, Complement fixation with antigens from, 72
Nontuberculous affection of spine, Localized, 1
—— spontaneous pneumothorax in infant, 29
—— tracheobronchial adenopathies in children, Chronic, 23
—— —— adenopathy, 82
Normal and immune guinea pigs, Rate of dissemination of tubercle bacilli in, 52
—— chest, X-ray of, 69
Nozao, S. Isolation of tubercle bacilli by Petroff's method, 47

Occupational pulmonary fibrosis, 35
O'Donovan, W. J., and Sequeira, J. H. Artificial light baths, 115
Ogawa, T. Complement fixation with antigens from acid-fast saprophytes, 73
——, ——., and Reiter, H. Complement fixation with antigens from nonpathogenic acid-fast bacilli, 72
Ohtsubo, Y. Tuberculosis of thyroid,83
Old tuberculin, Action of formaldehyde and heat on, 59
Old tuberculin and tubercle bacilli, Effect of, on experimental tuberculosis, 52
Olecranon, tuberculosis of, Treatment of, with ultraviolet light, 90
Oliver, T. Occupational pulmonary fibrosis, 35
Onset, sudden, in chronic pulmonary tuberculosis, Frequency of, 62
—— with hemoptysis in pulmonary tuberculosis, Significance of, 62
Open tuberculosis, School teachers with, 17
Operation, Albee, in tuberculous spondylitis, Late results of, 92
Operative treatment of tuberculous spondylitis, 92
Ophthalmic tests on cattle, 30
—— —— with phymatin in cattle, 30
Optic chiasm, Tuberculosis affecting, 94
Oraison. Unusual case of renal tuberculosis, 100
Orchidectomy in male genital tuberculosis, 102
Organization of artificial light clinic, 116
Origin and spread of male genital tuberculosis, 102
—— of phagocytic cells of lung, 36
—— —— tuberculosis of bladder, 101
Oschmann, A. Calcium-chloride treatment of surgical tuberculosis, 87
Ossoinig, K. Fornet's serum diagnosis of active tuberculosis in children, 20
Osteoarthritis, tuberculous, Resection of knee in, 88
Oxygen content of arterial blood in pulmonary tuberculosis and in artificial pneumothorax, 41

Pagel, W. Tuberculosis of duodenum, 84
Palate, tuberculosis of vault of, Perforating, 83
Paraf, J. Autoreinfection of tuberculous guinea pigs, 53
——, ——. Effect of exudate from allergic tuberculous peritonitis, 53
Paralysis due to tuberculosis of skull, 94
Parents, tuberculous, children of, Physique of, 20
Pathogenic subtilis bacillus in tuberculosis, 106

Pathognomonic X-ray finding in early pulmonary tuberculosis, 68
Pathology of pulmonary tuberculosis, Applied, 44
Patients, tuberculous, weight of, Seasonal variations in, 65
Patoir, Delannoy and Bizard. Tuberculosis of hernial sac, 86
Peacock, P. R. Tissue reactions to ultraviolet rays, 117
Pech, J. L. Biological antagonism of infrared and ultraviolet rays, 118
Peiser, J. Physique of children of tuberculous parents, 20
Pentavalent arsenic, Treatment of diarrhea in tuberculosis with, 85
Pérard, Speder and Gayet. Tuberculous abscess of rib invading interlobar fissure, 82
Percussion of lungs in children, 20
Perfecting chest roentgenograms, Method of, 68
Perforating tuberculosis of vault of palate, 83
Perforation of aorta, Tuberculous, 82
Periarterial sympathectomy in bone and joint tuberculosis, 89
Periarteritis, nodose, of lungs, Fatal hemoptysis due to, 79
Pericarditis, tuberculous, Primary, 82
Pericostal tuberculosis, treatment of, Surgical, 83
Period, Incubation, of tuberculosis, in children, 19
Peritoneal and genital tuberculosis, female, treatment of, X-ray, 103
Peritonitis, tuberculous, allergic, exudate from, Effect of, 53
——, ——, Treatment of, with ultraviolet light, 86
Petot, Debré and Duhem. Nontuberculous tracheobronchial adenopathy, 82
Petroff, S. A., and Stewart, F. W. Allergy from dead tubercle bacilli, 57
Petroff's method, Isolation of tubercle bacilli by, 47
Phagocytic cells of lung, Origin of, 36
Philibert, A., and Cordey, F. Experimental tuberculous reinfection of rabbit, 49, 50
Philip, R. Influence of antituberculosis campaign on tuberculosis mortality, 7
Phlyctenules in children, 22
Phototherapy with electric arc and mercury lamps, General, 115
Phrenicotomy, 127
——, Artificial pneumothorax and, 128
Phymatin, Ophthalmic tests with, in cattle, 30
Physical agents, Tuberculosis and, 107
—— findings, Value of, in diagnosis of pulmonary tuberculosis, 64
Physician, family, Tuberculosis and, 6
Physique of children of tuberculous parents, 20
Pigeons resistant to human and bovine tubercle bacilli, Chickens and, 30
Pinner, M., and Sweany, H. C. Pathogenic subtilis bacillus in tuberculosis, 106
Pirquet test, Modified, 74
Pissavy, A. Pleurisy in artificial pneumothorax, 44
Pitzen, P. Diagnosis of tuberculous spondylitis, 91
Pleura, Embryology and histology of lung and, 32
Pleural adhesions in tuberculosis in children, 23
—— effusions in X-ray, 43
—— ——, Sodium citrate in, 79
Pleurisy, Encysted, simulating hydatid cyst, 80
—— in artificial pneumothorax, 44
——, Mediastinal, 80
—— of mediastinum, 80
——, tuberculous, dry, treatment of, X-ray, 79
Pneumonia, Caseous, 33
Pneumothorax, artificial, Anatomical effects of, 43, 44
——, ——, and phrenicotomy, 128
——, ——, in infant, 28
——, ——, —— pulmonary tuberculosis, 128
——, ——, Oxygen content of arterial blood in pulmonary tuberculosis, and in, 41
——, ——, Pleurisy in, 44
Pneumothorax, Diagnostic, 66
——, spontaneous, Nontuberculous, in infant, 29
Points of lung structure, Key, 32
Pollet, Lévy and Babonneix. Encysted pleurisy simulating hydatid cyst, 80

Pollitzer, H. Relation of primary tuberculous polyarthritis to tubercle-bacillus sepsis, 88
Polyadenomatosis of colon, Tuberculous, 2
Polyarthritis, tuberculous, primary, Relation of, to tubercle-bacillus sepsis, 88
Postural rest in treatment of pulmonary tuberculosis, 108
Potez, G. Classifications of pulmonary tuberculosis in adults, 3
Predisposition to tuberculosis, 14
Predominantly bronchial tuberculosis in war-gassed patient, 35
Pregnancy and tuberculosis, 14
——, Influence of pulmonary tuberculosis on evolution of, 1
Preston, T. W., and Chandler, F. G. Pulmonary tuberculosis in children, 19
——, ——. ——., —— Savin, L. H. Phylctenules in children, 22
Prigge, R., Schlossberger, H., Hartoch, O., and Lusena, M. Complement fixation in tuberculosis, 71
Primary inoculation tuberculosis of skin, 98
—— tuberculosis of Bartholin's gland, 104
—— tuberculous foci in infants and children, 19
—— —— focus, Location of, 31
—— —— pericarditis, 82
—— —— polyarthritis, Relation of, to tubercle-bacillus sepsis, 88
Principles of artificial heliotherapy, 112
Problems, Tuberculosis, 6
Production of allergy by fluid from tuberculous guinea pigs, 53
—— —— immunity to tuberculosis in animals, 54
Prognosis of pulmonary cavities, Diagnosis and, 66
—— —— tuberculosis in infancy, 25
—— —— —— —— infants, Factors in, 29
Prophylaxis in tuberculosis in children, Immunity and, 28
—— of tuberculosis in infancy and childhood, 25
Prostate, adenomatous, Tuberculosis in, 103
Psychology and mental troubles of tuberculous, 61
——, psychopathology and psychotherapy in tuberculosis, 4
Psychopathology and psychotherapy in tuberculosis, Psychology, 4
Psychotherapy in tuberculosis, Psychology, psychopathology and, 4
Pulmonary and laryngeal tuberculosis, Homolateral, 79
—— cavities, Diagnosis and prognosis of, 66
—— fibrosis, Occupational, 35
—— infection, tuberculous, in exposed children, X-ray evidence of, 20
—— lesions, chronic, Differential diagnosis of, 66
—— ——, X-ray and clinical study of, 68
—— sclerosis following tuberculous splenopneumonia in infancy, 24
Pulmonary tuberculosis and extrapulmonary localizations, 87
—— ——, Artificial pneumothorax in, 128
—— ——, chronic, Classification of, 3
—— ——, ——, sudden onset in, Frequency of, 62
—— ——, Classification of, 2
—— ——, Classifications of, in adults, 3
—— ——, Collapse therapy in, 119
—— ——, diagnosis of, Value of physical findings in, 64
—— ——, —— ——, X-ray and clinical, 68
—— ——, —— ——, ——, Artificial lighting of apices in, 69
—— ——, Diet in, 108
—— ——, early, Pathognomonic X-ray finding in, 68
—— ——, —— treatment in, Importance of, 106
—— ——, Hematogenous dissemination in, 36
—— —— in army recruits, 5
—— —— —— children, 19
—— ——, infection in, Cutaneous route of, 18
—— ——, Influence of, on evolution of pregnancy, 1
—— ——, latent period of, So called, 63
—— ——, Leucocytes in, 37
—— ——, Matéfy reaction in, 76
—— ——, Oxygen content of arterial blood in, and in artificial pneumothorax, 41
—— ——, pathology of, Applied, 44
—— ——, Serum lipase in, 61

Pulmonary tuberculosis, Significance of onset with hemoptysis in, 62
—— ——, Thoracectomy in, 125
—— ——, thoracoplasty in, Extrapleural, 126, 127
—— ——, treatment of, rest in, Postural, 108
—— ——, —— ——, —— of lung in, 126
—— ——, —— ——, Surgical, 120, 122, 123, 124
—— ——, —— ——, ——, Toxicity of blood serum after, 124
—— ——, Types of, 31
—— ——, Valvular heart disease and, 17
—— ——, X-ray in, 67
Pulsus paradoxus, so called, Distention of heart on inspiration, and, 39
Pyotropin and other drugs, Treatment of lupus with, 98
——, Treatment of lupus with, 99

Rabbit, Experimental tuberculous reinfection of, 49, 50
Rabbits, tuberculin in, Fate of, 60
——, tuberculosis in, Experimental chronic, 52
Radiations with X-rays, heavy, Intrathoracic changes from, 43
Radiotherapy in treatment of tuberculous cervical adenitis, 119
Rate of dissemination of tubercle bacilli in normal and immune guinea pigs, 52
Rays, infrared and ultraviolet, Biological antagonism of, 118
——, light, Intensity of, 42
——, ultraviolet, Blood chemistry and, 118
——, ——, Dosage of, 117
——, ——, of sunlight, 42
——, ——, Tissue reactions to, 117
Reaction, flocculation, Daranyi, 76
——, Matéfy, in pulmonary tuberculosis, 76
——, Tuberculin, 58
——, ——, and water balance, 60
——, ——, error in study of, Causes of, 74
——, ——, Influence of serum on, 59
——, urochromogen, Value of, in surgical tuberculosis, 88
Reactions, Botello's and other, in tuberculosis, 75
——, Flocculation and agglutination, 76
——, Tissue, to ultraviolet rays, 117
Recovery from tuberculous meningitis, 95
Recruits, army, Pulmonary tuberculosis in, 5
Rectum, stricture of, Tuberculous, 85
Red-cell sedimentation test, 75
—— —— ——, Combined tuberculin and, 75
—— —— tests, Flocculation and, 76
Redeker, F. Hilum tuberculosis in children, 23
Reflex, Abdominal, in tuberculosis, 65
Reflexes of neck, Tonic, in tuberculous meningitis, 97
Refractometric and viscosimetric examinations of blood serum in tuberculosis, 76
Reinfection of rabbit, Experimental tuberculous, 49, 50
Reiter, H., and Köster, H. Complement fixation in tuberculosis, 72
——, ——., —— Ogawa, T. Complement fixation with antigens from nonpathogenic acid-fast bacilli, 72
Relation of angiokeratoma to tuberculosis, 100
—— —— primary tuberculous polyarthritis to tubercle-bacillus sepsis, 88
Remarks on Turban's classification, 4
Renal tuberculosis, bilateral, Frequency of, 101
—— ——, Cause of, 100
—— ——, Late results of, 100
—— ——, Unusual case of, 100
Report of Belgian National Antituberculosis League for 1923, 11
Resection of knee in tuberculous osteoarthritis, 88
Resistance of acid-fast bacteria to antiformin, 47
Resistant to human and bovine tubercle bacilli, Chickens and pigeons, 30
Resorption factors in the lung, 41
Resort, health, Montana, Switzerland, as, 106
Respiratory tract, upper, Tuberculosis of, 79
Rest of lung in treatment of pulmonary tuberculosis, 126
——, Postural, in treatment of pulmonary tuberculosis, 108
Results of Albee operation in tuberculous spondylitis, Late, 92
—— —— renal tuberculosis, Late, 100

Results of sanatorium treatment, 109
Rheins. Symbiosis of tubercle bacillus and man, 48
Rib, Tuberculous abscess of, invading interlobar fissure, 82
Ribadeau-Dumas, L., and Debray, J. Tuberculous tracheobronchial adenopathy as cause of anorexia, 81
Rice, C. H., and Myers, J. A. Clinical importance of vital capacity in lung conditions, 45
Richter, W. Lupus erythematosus complicated by erythema centrifugum, 97
Rieckenberg. Theory of tuberculin action, 59
Rieux, J., and Chaumet, G. Pulmonary tuberculosis in army recruits, 5
Rist, E. Functional correlations between lungs and heart, 40
——, ——., and Walser, J. Distention of heart on inspiration, and so called pulsus paradoxus, 39
Riviere, C. X-ray of normal chest, 69
Roentgenograms, chest, Method of perfecting, 68
Rogers, W. A., and Smith-Peterson, M. M. Arthrodesis for sacroiliac tuberculosis, 92
Romanis, W. H. C. Surgical treatment of pulmonary tuberculosis, 124
Roque, Morenas and Delore. Intestinal tuberculosis secondary to amebic dysentery, 85
Roubier. Anatomical effects of artificial pneumothorax, 43
Route of infection in pulmonary tuberculosis, Cutaneous, 18
Rowntree, L. G. Addison's disease, 104

Sac, hernial, Tuberculosis of, 86
Sacroiliac tuberculosis, Arthrodesis for, 92
Salomon, Thomas and Bernard. Treatment of diarrhea in tuberculosis with pentavalent arsenic, 85
——, Valtin and Bernard, L. Complement fixation in tuberculosis, 71
Sanatorium treatment at high altitude, Disappearance of elastic fibres from sputum during, 110
—— ——, Duration of, 110
Sanatorium treatment of juvenile tuberculosis, 109
—— ——, Results of, 109
Sanger, H. Immunity to tuberculosis from dead tubercle bacilli, 57
Saprophytes, acid-fast, Complement fixation with antigens from, 73
Sarbadhikary, S., and Moral, H. Tuberculin reaction, 58
Sauer, L. W. Immunity and prophylaxis in tuberculosis in children, 28
Sauerbruch, F. Development of chest surgery in last twenty years, 120
Savin, L. H., and Preston, T. W. Phylctenules in children, 22
Schilf, F. Influence of scurvy on allergy in tuberculosis, 54
Schilling, C. Action of extracts of tubercle bacilli, 56
——, ——., and Hackenthal, H. Hypersensitive tests with watery extracts of tubercle bacilli, 56
Schlegel, M. Influence of serum on tuberculin, 60
Schlossberger, H., Hartoch, O., Lusena, M., and Prigge, R. Complement fixation in tuberculosis, 71
Schneider, A. Value of physical findings in diagnosis of pulmonary tuberculosis, 64
Schoenheit, E. W., and Dienes, L. Specific substances in alcoholic extracts of tubercle bacilli, 60
School teachers with open tuberculosis, 17
Schulte-Tigges, H. Leucocytes in pulmonary tuberculosis, 37
——, ——. Phrenicotomy, 127
——, ——. X-ray treatment of tuberculosis, 118
Schulze, W. Ophthalmic tests on cattle, 30
Schur, M. Menstruation and immunity in tuberculosis, 1
Schutze, H. Production of immunity to tuberculosis in animals, 54
Scientific meeting of Antwerp section of Belgian Antituberculosis League, 12
Sclerosis, Pulmonary, following tuberculous splenopneumonia in infancy, 24
Scurvy and tuberculosis, 53, 54
——, Influence of, on allergy in tuberculosis, 54

Sea voyages in treatment of tuberculosis of infants, 111
Seasonal variations in weight of tuberculous patients, 65
Sebestyen, J. Periarterial sympathectomy in bone and joint tuberculosis, 89
Secondary to amebic dysentery, Intestinal tuberculosis, 85
Sedimentation test, Red-cell, 75
—— ——, ——, Combined tuberculin and, 75
—— tests, red-cell, Flocculation and, 76
Séguin, P., and Duhem, P. Mediastinal pleurisy, 80
Seiffert, G., and Meier, I. B. Complement fixation for diagnosis of tuberculosis in cattle, 31
Seligmann, E., and v. Gutfield, F. Immunization with dead tubercle bacilli, 57
Selter, H. Skin sensitiveness and immunity to tuberculosis, 55
——, ——., and Geschke. Allergy and immunity from dead and cold-blooded tubercle bacilli, 57
Semenow, W. P. New staining method for tubercle bacilli in sputum, 73
Sensitiveness, Skin, due to tuberculin and vaccinia combined, 55
Sepsis, tubercle-bacillus, Relation of primary tuberculous polyarthritis to, 88
Sequeira, J. H., and O'Donovan, W. J. Artificial light baths, 115
Serological diagnosis of active tuberculosis, 70
Serum, blood, in tuberculosis, Refractometric and viscosimetric examinations of, 76
——, ——, Lipolytic activity of, in tuberculosis of children, 25
——, ——, Toxicity of, after surgical treatment of pulmonary tuberculosis, 124
—— diagnosis, Fornet's, of active tuberculosis in children, 20
——, Influence of, on tuberculin, 60
——, Influence of, on tuberculin reaction, 59
—— lipase in pulmonary tuberculosis, 61
Sevier, C. E. Heliotherapy and tuberculous spondylitis, 91
Shape of chest of tuberculous and healthy Japanese, 32
Shepard, W. P., and Myers, J. A. Vital-capacity standards, 45
Shibata, M., Kumagaya, K., Kobayashi, K., and Yabe, T. Yabe's modified strain of tubercle bacilli, 48
Sicard and Forestier. Diagnosis of migratory tuberculous abscess by lipiodol, 66
Siemens, H. W. Etiology of lupus erythematosus, 97
Significance of erythema nodosum, 99
—— —— onset with hemoptysis in pulmonary tuberculosis, 62
—— —— tuberculin hypersensitiveness, Clinical, 55
Silberstern, E., and Frisch, A. V. Fate of tuberculin in rabbits, 60
——, ——., —— ——, ——. ——. Influence of serum on tuberculin reaction, 59
Simon, G. Exercise in treatment of tuberculosis, 108
Simulating hydatid cyst, Encysted pleurisy, 80
—— lymphatic leukemia, Tuberculosis, 74
Skavlem, J. H., and Dunham, K. Applied pathology of pulmonary tuberculosis, 44
Skin sensitiveness due to tuberculin and vaccinia combined, 55
Skull, tuberculosis of, Paralysis due to, 94
Sloan, M. F., and Kahn, M. X-ray and clinical study of pulmonary lesions, 68
Smellie, J. M. Tuberculosis of tracheobronchial lymph nodes, 23
Smith, M. K., and Hopkins, J. G. Radiotherapy in treatment of tuberculous cervical adenitis, 119
Smith-Peterson, M. M., and Rogers, W. A. Arthrodesis for sacroiliac tuberculosis, 92
So called latent period of pulmonary tuberculosis, 63
Sodium citrate in pleural effusions, 79
Solitary cerebellar tuberculoma in infant, 29
—— tuberculosis of spleen, 87
Some aspects of tuberculosis in military life, 4
Sonnenfeld, A., and Kalcher, H. Serological diagnosis of active tuberculosis, 70
Sounds, lung, Frequency characteristics of, 64
Southard, J. D. X-ray treatment of tuberculosis of bones, 89
Specific substances in alcoholic extracts of tubercle bacilli, 60

Speder, Gayet and Pérard. Tuberculous abscess of rib invading interlobar fissure, 82
Spermatic cord, Tuberculosis of vascular bundle of, 102
Spine, Localized nontuberculous affection of, 1
Spleen, tuberculosis of, Solitary, 87
Splenomegaly, Tuberculous, 87
Splenopneumonia, tuberculous, Pulmonary sclerosis following, in infancy, 24
Splint, lung, New, 108
Spondylitis, Tuberculous, 90
——, ——, Albee operation in, Late results of, 92
——, ——, Diagnosis of, 91
——, ——, Heliotherapy and, 91
——, ——, Treatment of, 91
——, ——, —— ——, Operative, 92
Spontaneous dislocation from early tuberculosis of hip-joint, 93
—— pneumothorax, Nontuberculous, in infant, 29
Spread of male genital tuberculosis, Origin and, 102
—— —— tubercle bacilli in body, 17
Sputum, Disappearance of elastic fibres from, during sanatorium treatment at high altitude, 110
——, Homogenization of, with urea, 74
—— test, Alizarin, 73
——, tubercle bacilli in, New staining method for, 73
Staining method for tubercle bacilli in sputum, New, 73
Standards, Vital-capacity, 45
Stargardter. Percussion of lungs in children, 20
Sternberg, C. Fatal hemoptysis due to nodose periarteritis of lungs, 79
Stewart, F. W., and Petroff, S. A. Allergy from dead tubercle bacilli, 57
Stewart, W. H. Pleural effusions in X-ray, 43
Stokes, J. H. Primary inoculation tuberculosis of skin, 98
Stomach, Tuberculosis of, 84
Stools of children, tubercle bacilli in, Diagnostic value of, 21
Strain of tubercle bacilli, Yabe's modified, 48
Stricture of rectum, Tuberculous, 85
Structure, lung, Key points of, 32
Strychnine and chloroform, Effect of, on tuberculosis complement fixation, 73
Stubbs, E. L. Tuberculin test for avian tuberculosis, 30
Studies on bronchial movements, X-ray, 32
—— —— tuberculosis mortality, 7
—— of pulmonary lesions, X-ray and clinical, 68
—— —— tuberculin reaction, Causes of error in, 74
Substances, Specific, in alcoholic extracts of tubercle bacilli, 60
Subtilis bacillus, Pathogenic, in tuberculosis, 106
Sudden onset in chronic pulmonary tuberculosis, Frequency of, 62
Sumiyoshi, Y. Experimental tuberculosis of adrenals in guinea pigs, 53
——, ——. Isolation of tubercle bacilli, 47
Sundell, C., Kjellin, G., and Forssner, H. Pregnancy and tuberculosis, 14
Sunlight and artificial light, Influence of, on health, 114
——, Artificial, in treatment of internal tuberculosis in Japan, 116
——, Effect of, on growth and development, 111
——, Ultraviolet rays of, 42
Surgery, chest, Development of, in last twenty years, 120
Surgical treatment of laryngeal tuberculosis, 78
—— —— —— pericostal tuberculosis, 83
—— —— —— pulmonary tuberculosis, 120, 122, 123, 124
—— —— —— —— —— ——, Toxicity of blood serum after, 124
—— —— —— tuberculosis of hip, 93
Surgical tuberculosis, Heliotherapy of, 87
—— ——, —— and actinotherapy in, 115
—— ——, treatment of, Calcium-chloride, 87
—— ——, —— ——, with yatren, 88
—— ——, urochromogen reaction in, Value of, 88
Susceptibility to tuberculosis, Immunization and, 56
Sussig, L. Origin and spread of male genital tuberculosis, 102

Sweany, H. C., and Pinner, M. Pathogenic subtilis bacillus in tuberculosis, 106
Switzerland, Montana, as health resort, 106
Symbiosis of tubercle bacillus and man, 48
Sympathectomy, Periarterial, in bone and joint tuberculosis, 89

Takenchi, J. Immunization and susceptibility to tuberculosis, 56
Tallerman, K. H. Fibrosis at base of lungs in children, 24
Taubert, R. Tuberculosis in aged, 6
Tavernier, M. Tuberculous polyadenomatosis of colon, 2
Teachers, School, with open tuberculosis, 17
Technique, laboratory, Clinical, applicable to tuberculosis, 69
Tédenat. Resection of knee in tuberculous osteoarthritis, 88
Tegtmeier. Combined tuberculin and red cell sedimentation test, 75
Tendon sheaths of hand, tuberculosis of, Differential diagnosis of, 90
Test, Pirquet, Modified, 74
——, Red-cell sedimentation, 75
——, —— ——, Combined tuberculin and, 75
——, sputum, Alizarin, 73
——, Tuberculin, for avian tuberculosis, 30
Tests, Flocculation and red-cell sedimentation, 76
——, Hypersensitive, with watery extracts of tubercle bacilli, 56
——, Ophthalmic, on cattle, 30
——, ——, with phymatin, in cattle, 30
Thearle, W. H. Extrapleural thoracoplasty in pulmonary tuberculosis, 127
Theory of tuberculin action, 59
Therapeutic value of light, 111
Therapy, Collapse, in pulmonary tuberculosis, 119
Thomas, Bernard and Salomon. Treatment of diarrhea in tuberculosis with pentavalent arsenic, 85
Thoracectomy in pulmonary tuberculosis, 125
Thoracoplasty, Extrapleural, in pulmonary tuberculosis, 126, 127
Thorax, tuberculous abscess of, Extensive extirpation of large, 83
Thyroid, Tuberculosis of, 83
Thyroidectomy, Influence of, on tuberculosis, 53
Tissue reactions to ultraviolet rays, 117
Tixier. Ileo-cecal tuberculosis with hydroappendix, 85
Tonenberg, L. Tuberculosis of hernial sac, 86
Tonic reflexes of neck in tuberculous meningitis, 97
Toxicity of blood serum after surgical treatment of pulmonary tuberculosis, 124
Tracheobronchial adenopathies in children, Chronic nontuberculous, 23
—— adenopathy, Nontuberculous, 82
—— ——, Tuberculous, as cause of anorexia, 81
—— lymph nodes, Tuberculosis of, 23, 80
—— —— ——, —— ——, Treatment of, 81
Transformation of leucocytes into epithelioid cells, 37
Treatment, early, in pulmonary tuberculosis, Importance of, 106
——, ektebin, Leucocytes after, 39
—— of diarrhea in tuberculosis with pentavalent arsenic, 85
—— —— dry tuberculous pleurisy, X-ray, 79
—— —— female peritoneal and genital tuberculosis, X-ray, 103
—— —— internal tuberculosis, Artificial sunlight in, in Japan, 116
—— —— joint tuberculosis in children, 28
—— —— juvenile tuberculosis, Sanatorium, 109
—— —— laryngeal tuberculosis, Surgical, 78
—— —— lupus by ionization, 97
—— —— —— erythematosus with aurophos, 98
—— —— —— with chloramine, 99
—— —— —— —— pyotropin, 99
—— —— —— —— —— and other drugs, 98
—— —— pericostal tuberculosis, Surgical, 83
—— —— pulmonary tuberculosis, rest in, Postural, 108

Treatment of pulmonary tuberculosis, rest of lung in, 126
—— —— —— ——, Surgical, 120, 122, 123, 124
—— —— —— ——, ——, Toxicity of blood serum after, 124
—— —— surgical tuberculosis, Calcium-chloride, 87
—— —— —— —— with yatren, 88
—— —— tuberculosis, Dietetic, 108
—— —— ——, Exercise in, 108
—— —— —— in children, X-ray, 21
—— —— —— of bones, X-ray, 89
—— —— —— —— hip, Surgical, 93
—— —— —— —— infants, Sea voyages in, 111
—— —— —— —— joints in Japan, 89
—— —— —— —— olecranon with ultra-violet light, 90
—— —— —— —— tracheobronchial lymph nodes, 81
—— —— ——, X-ray, 118
—— —— tuberculous cervical adenitis, Radiotherapy in, 119
—— —— —— cystitis with methylene blue, 102
—— —— —— peritonitis with ultraviolet light, 86
—— —— —— spondylitis, 91
—— —— —— ——, Operative, 92
——, sanatorium, at high altitude, Disappearance of elastic fibres from sputum during, 110
——, ——, Duration of, 110
——, ——, of juvenile tuberculosis, 109
——, ——, Results of, 109
——, Surgical, of laryngeal tuberculosis, 78
——, ——, —— pericostal tuberculosis, 83
——, ——, —— pulmonary tuberculosis, 120, 122, 123, 124
——, ——, —— —— ——, Toxicity of blood serum after, 124
——, ——, —— tuberculosis of hip, 93
——, X-ray, of dry tuberculous pleurisy, 79
——, ——, —— female peritoneal and genital tuberculosis, 103
——, ——, —— tuberculosis, 118
——, ——, —— —— in children, 21
——, ——, —— —— of bones, 89
Treu, R. Influence of serum on tuberculin reaction, 59
Tropics, Diagnosis of tuberculosis in, 65
——, Tuberculosis in, 12
Trostler, I. S., and Hayes, R. M. Pathognomonic X-ray finding in early pulmonary tuberculosis, 68
Trudeau, F. B. Significance of onset with hemoptysis in pulmonary tuberculosis, 62
Tube, new type of, X-ray of lungs with, 69
Tubercle bacilli, Classification of, 46
—— ——, dead, Allergy from, 56, 57
—— ——, —— and cold-blooded, Allergy and immunity from, 57
—— ——, ——, Immunity to tuberculosis from, 57
—— ——, ——, Immunization with, 57
—— ——, Effect of old tuberculin and, on experimental tuberculosis, 52
—— ——, Egg-yolk medium for, 48
—— ——, extracts of, Action of, 56
—— ——, growth of, Influence of hydrogen-ion concentration of media on, 47
—— ——, human and bovine, Chickens and pigeons resistant to, 30
—— ——, Hypersensitive tests with watery extracts of, 56
—— —— in bone-marrow, 47
—— —— —— intestinal tract, Mechanism of absorption of, 48
—— —— —— sputum, New staining method for, 73
—— —— —— stools of children, Diagnostic value of, 21
—— ——, isolating, New method for, 47
—— ——, Isolation of, 47
—— ——, —— ——, by Petroff's method, 47
—— ——, modified strain of, Yabe's, 48
—— ——, Rate of dissemination of, in normal and immune guinea pigs, 52
—— ——, Specific substances in alcoholic extracts of, 60
—— ——, Spread of, in body, 17
Tubercle bacillus and man, Symbiosis of, 48
—— —— sepsis, Relation of primary tuberculous polyarthritis to, 88
Tuberculin, Action of, 58
—— ——, Theory of, 59
—— and red-cell sedimentation test, Combined, 75

Tuberculin and vaccinia combined, Skin sensitiveness due to, 55
—— hypersensitiveness and immunity to tuberculosis, 55
—— ——, Clinical significance of, 55
—— in rabbits, Fate of, 60
——, Influence of serum on, 60
——, Local hypersensitiveness produced by, 55
——, old, Action of formaldehyde and heat on, 59
——, ——, and tubercle bacilli, Effect of, on experimental tuberculosis, 52
—— reaction, 58
—— —— and water balance, 60
—— ——, error in study of, Causes of, 74
—— ——, Influence of serum on, 59
—— test for avian tuberculosis, 30
Tuberculoma, cerebellar, Solitary, in infant, 29
Tuberculosis, Abdominal reflex in, 65
——, active, diagnosis of, Serological, 70
—— affecting optic chiasm, 94
——, allergy in, Influence of scurvy on, 54
—— and family physician, 6
—— —— fistula-in-ano, 86
—— —— physical agents, 107
——, avian, Tuberculin test for, 30
——, blood serum in, Refractometric and viscosimetric examinations of, 76
——, bone and joint, Periarterial sympathectomy in, 89
——, Botello's and other reactions in, 75
——, bronchial, in war-gassed patient, Predominantly, 35
——, Clinical laboratory technique applicable to, 69
—— colonies, 7
—— complement fixation, Effect of strychnine and chloroform on, 73
——, —— —— in, 70, 71, 72
——, Conjugal, 16
—— control in England, 9
——, diagnosis of, in cattle, Complement fixation for, 31
——, —— ——, —— tropics, 65
——, diarrhea in, Treatment of, with pentavalent arsenic, 85
——, experimental, Effect of old tuberculin and tubercle bacilli on, 52
——, genital, male, Orchidectomy in, 102
Tuberculosis, genital, male, Origin and spread of, 102
——, Heredity in, 13
——, —— ——, Different aspects of, 39
——, Hilum, in children, 23
——, —— infection in, 14
——, Ileo-cecal, with hydroappendix, 85
——, Immunity to, from dead tubercle bacilli, 57
——, —— ——, Production of, in animals, 54
——, —— ——, Skin sensitiveness and, 55
——, Immunization and susceptibility to, 56
—— in adenomatous prostate, 103
—— —— Africa, 12
—— —— aged, 6
—— —— cattle, diagnosis of, Complement fixation for, 31
—— —— children, 18
—— —— ——, active, Fornet's serum diagnosis of, 20
—— —— ——, Immunity and prophylaxis in, 28
—— —— ——, Pleural adhesions in, 23
—— —— ——, Pulmonary, 19
—— —— ——, treatment of, X-ray, 21
—— —— guinea pigs, Influence of vitamines on, 54
—— —— infancy and childhood, Prophylaxis of, 25
—— —— ——, Prognosis of, 25
—— —— infants, prognosis of, Factors in, 29
—— —— military life, Some aspects of, 4
—— —— rabbits, Experimental chronic, 52
—— —— tropics, 12
——, Incubation period of, in children, 19
——, Influence of thyroidectomy on, 53
——, internal, treatment of, Artificial sunlight in, in Japan, 116
——, Intestinal, secondary to amebic dysentery, 85
——, joint, Treatment of, in children, 28
——, juvenile, treatment of, Sanatorium, 109
——, laryngeal, Laryngocele and aerocele in case of, 79
——, ——, treatment of, Surgical, 78
——, Leucopenia in, 38
——, Menstruation and immunity in, 1
——, miliary, Healed, 105
—— mortality and economic condition, 17

Tuberculosis mortality, Influence of antituberculosis campaign on, 7
—— ——, Studies on, 7
Tuberculosis of adrenals in guinea pigs, Experimental, 53
—— —— Bartholin's gland, Primary, 104
—— —— bladder, Origin of, 101
—— —— bones, Multiple, 89
—— —— ——, treatment of, X-ray, 89
—— —— breast, 82
—— —— cerebrum, 94
—— —— children, Leucocytes in, 25
—— —— ——, Lipolytic activity of blood serum in, 25
—— —— duodenum, 84
—— —— esophagus, 84
—— —— eye, 77
—— —— hernial sac, 86
—— —— hip in children, 93
—— —— ——, treatment of, Surgical, 93
—— —— hip-joint, early, Spontaneous dislocation from, 93
—— —— infants and children, 18
—— —— ——, treatment of, Sea voyages in, 111
—— —— joints, Treatment of, in Japan, 89
—— —— knee-joint, 93
—— —— lungs, miliary, Chronic, 105
—— —— middle ear and larynx in children, 78
—— —— mouth, 83
—— —— nervous system, 95
—— —— olecranon, Treatment of, with ultraviolet light, 90
—— —— skin, Primary inoculation, 98
—— —— skull, Paralysis due to, 94
—— —— spleen, Solitary, 87
—— —— stomach, 84
—— —— tendon sheaths of hand, Differential diagnosis of, 90
—— —— thyroid, 83
—— —— tracheobronchial lymph nodes, 23, 80
—— —— —— —— ——, Treatment of, 81
—— —— udder, 31
—— —— upper respiratory tract, 79
—— —— vagina, 103
—— —— vascular bundle of spermatic cord, 102
—— —— vault of palate, Perforating, 83
——, pericostal, treatment of, Surgical, 83
Tuberculosis, peritoneal and genital, female, Treatment of, X-ray, 103
——, Predisposition to, 14
——, Pregnancy and, 14
—— problems, 6
——, Prognosis of, in infancy, 25
——, —— ——, —— infants, Factors in, 29
——, Prophylaxis of, in infancy and childhood, 25
——, Psychology, psychopathology and psychotherapy in, 4
——, Pulmonary and extrapulmonary localizations, 87
——, —— —— laryngeal, Homolateral, 79
——, ——, Artificial pneumothorax in, 128
——, ——, chronic, Classification of, 3
——, ——, ——, sudden onset in, Frequency of, 62
——, ——, Classification of, 2
——, ——, Classifications of, in adults, 3
——, ——, Collapse therapy in, 119
——, ——, diagnosis of, Value of physical findings in, 64
——, ——, —— ——, X-ray and clinical, 68
——, ——, —— ——, ——, Artificial lighting of apices in, 69
——, ——, Diet in, 108
——, ——, early, Pathognomonic X-ray finding in, 68
——, ——, —— treatment in, Importance of, 106
——, ——, Hematogenous dissemination in, 32
——, ——, in army recruits, 5
——, ——, —— children, 19
——, ——, infection in, Cutaneous route of, 18
——, ——, Influence of, on evolution of pregnancy, 1
——, ——, latent period of, So called, 63
——, ——, Leucocytes in, 37
——, ——, Mátéfy reaction in, 76
——, ——, Oxygen content of arterial blood in, and in artificial pneumothorax, 41
——, ——, pathology of, Applied, 44
——, ——, Serum lipase in, 61
——, ——, Significance of onset with hemoptysis in, 62
——, ——, Thoracectomy in, 125
——, ——, thoracoplasty in, Extrapleural, 126, 127

Tuberculosis, pulmonary, treatment of, rest in, Postural, 108
——, ——, —— ——, —— of lung in, 126
——, ——, —— ——, Surgical, 120, 122, 123, 124
——, ——, —— ——, ——, Toxicity of blood serum after, 124
——, ——, Types of, 31
——, ——, Valvular heart disease and, 17
——, ——, X-ray in, 67
——, Relation of angiokeratoma to, 100
——, renal, bilateral, Frequency of, 101
——, ——, Cause of, 100
——, ——, Late results of, 100
——, ——, Unusual case of, 100
——, sacroiliac, Arthrodesis for, 92
——, School teachers with open, 17
——, Scurvy and, 53, 54
—— simulating lymphatic leukemia, 74
——, subtilis bacillus in, Pathogenic, 106
——, surgical, Heliotherapy and actinotherapy in, 115
——, ——, —— of, 87
——, ——, treatment of, Calcium-chloride, 87
——, ——, —— ——, with yatren, 88
——, ——, urochromogen reaction in, Value of, 88
——, treatment of, Dietetic, 108
——, —— ——, Exercise in, 108
——, —— ——, X-ray, 118
——, —— ——, ——, in children, 21
——, Vaccination of newborn against, 27
Tuberculous abscess, Diagnosis of migratory, by lipiodol, 66
—— —— of interlobar origin in chest-wall, 83
—— —— —— rib invading interlobar fissure, 82
—— —— —— thorax, Extensive extirpation of large, 83
—— adenitis, Generalized, 77
—— and healthy Japanese, Shape of chest of, 32
——, anesthesia in, Local, 6
—— cervical adenitis, treatment of, Radiotherapy in, 119
—— chondritis, 89
—— cystitis, Treatment of, with methylene blue, 102
Tuberculous foci, Primary, in infants and children, 19
—— focus, primary, Location of, 31
—— guinea pigs, Autoreinfection of, 53
—— —— ——, fluid from, Production of allergy by, 53
—— hip-joint, Fusion of, 93
—— infection, Ferran's ideas of, 49
—— lesions, Epithelioid cells of, 38
—— lymph nodes of hepatic pedicle, Chronic icterus from, 84
—— meningitis, Recovery from, 95
—— ——, Tonic reflexes of neck in, 97
—— ——, Unusual case of, in child, 28
—— osteoarthritis, Resection of knee in, 88
—— parents, children of, Physique of, 20
—— patients, weight of, Seasonal variations in, 65
—— perforation of aorta, 82
—— pericarditis, Primary, 82
—— peritonitis, allergic, exudate from, Effect of, 53
—— ——, Treatment of, with ultraviolet light, 86
—— pleurisy, dry, treatment of, X-ray, 79
—— polyadenomatosis of colon, 2
—— polyarthritis, primary, Relation of, to tubercle-bacillus sepsis, 88
——, Psychology and mental troubles of, 61
—— pulmonary infection in exposed children, X-ray evidence of, 20
—— reinfection of rabbit, Experimental, 49, 50
—— splenomegaly, 87
—— splenopneumonia in infancy, Pulmonary sclerosis following, 24
—— spondylitis, 90
—— ——, Albee operation in, Late results of, 92
—— ——, Diagnosis of, 91
—— ——, Heliotherapy and, 91
—— ——, Treatment of, 91
—— ——, —— ——, Operative, 92
—— stricture of rectum, 85
—— tracheobronchial adenopathy as cause of anorexia, 81
Turban, K. Classification of chronic pulmonary tuberculosis, 3
Turban's classification, Remarks on, 4
Types of pulmonary tuberculosis, 31

Udder, Tuberculosis of, 31
Ulrici, H. Collapse therapy in pulmonary tuberculosis, 119
Ultraviolet light, Treatment of tuberculosis of olecranon with, 90
—— ——, —— —— tuberculous peritonitis with, 86
—— rays, Biological antagonism of infrared and, 118
—— ——, Blood chemistry and, 118
—— ——, Dosage of, 117
—— —— of sunlight, 42
—— ——, Tissue reactions to, 117
Unusual case of renal tuberculosis, 100
—— —— —— tuberculous meningitis in child, 28
Unverricht. Artificial pneumothorax and phrenicotomy, 128
Upper respiratory tract, Tuberculosis of, 79
Urbain, Brocq-Rousseu and Cauchemez. Effect of strychnine and chloroform on tuberculosis complement fixation, 73
Urea, Homogenization of sputum with, 74
Urochromogen reaction, Value of, in surgical tuberculosis, 88
Uter, W. X-ray treatment of female peritoneal and genital tuberculosis, 103

Vaccination of newborn against tuberculosis, 27
Vaccinia, Skin sensitiveness due to tuberculin and, combined, 55
Vagina, Tuberculosis of, 103
Valtin, Salomon and Bernard, L. Complement fixation in tuberculosis, 71
Valtis, J. Extrapleural thoracoplasty in pulmonary tuberculosis, 127
Value, Diagnostic, of tubercle bacilli in stools of children, 21
—— of light, Therapeutic, 111
—— —— physical findings in diagnosis of pulmonary tuberculosis, 64
—— —— urochromogen reaction in surgical tuberculosis, 88
Valvular heart disease and pulmonary tuberculosis, 17
Van Beneden, J. Vaccination of newborn against tuberculosis, 27
Van Couterin. Tuberculosis and physical agents, 107
Variations in weight of tuberculous patients, Seasonal, 65
Vascular bundle of spermatic cord, Tuberculosis of, 102
Vault of palate, tuberculosis of, Perforating, 83
Verliac and Legueu. Tuberculosis in adenomatous prostate, 103
Viets, W. Disappearance of elastic fibres from sputum during sanatorium treatment at high altitude, 110
Viscosimetric examinations of the blood serum in tuberculosis, Refractometric and, 76
Vital capacity in lung conditions, Clinical importance of, 45
—— —— of Minneapolis firemen, 45
—— —— standards, 45
Vitamines, Influence of, on tuberculosis in guinea pigs, 54
Vivian, C. S. Orchidectomy in male genital tuberculosis, 102
Voûte, H. Multiple tuberculosis of bones, 89
Voyages, Sea, in treatment of tuberculosis of infants, 111

Walser, J., and Rist, E. Distention of heart on inspiration and so called pulsus paradoxus, 39
Walter. Ferran's ideas of tuberculous infection, 49
Walters, F. R. Diet in pulmonary tuberculosis, 108
War-gassed patient, Predominantly bronchial tuberculosis in, 35
Waring, J. J. X-ray and clinical diagnosis of pulmonary tuberculosis, 68
Watanabe, K. Artificial sunlight in treatment of internal tuberculosis in Japan, 116
Watanabe, S., and Kamino, K. Botello's and other reactions in tuberculosis, 75
Water balance, Tuberculin reaction and, 60
Watery extracts of tubercle bacilli, Hypersensitive tests with, 56
Webb, G. B. Postural rest in treatment of pulmonary tuberculosis, 108
Weber, F. P. Erythema nodosum in children, 22

Wechsler, I. S. Tonic reflexes of neck in tuberculous meningitis, 97
Weight of tuberculous patients, Seasonal variations in, 65
Weise, K. Egg-yolk medium for tubercle bacilli, 48
Weiss, M. Dietetic treatment of tuberculosis, 108
——, ——. Local hypersensitiveness produced by tuberculin, 55
Weisz, A. X-ray treatment of tuberculosis in children, 21
Wetchler, S. Tuberculosis in children, 18
Weyl, C. N., and McPhedran, F. M. Method of perfecting chest roentgenograms, 68
Wharton, L. R. Tuberculosis of vagina, 103
Whitfield, J. B. Treatment of lupus by ionization, 97
Whittemore, W. Extrapleural thoracoplasty in pulmonary tuberculosis, 126
Wichels, P., and Böhlau, H. Laryngocele and aerocele in case of laryngeal tuberculosis, 79
Wichmann, P. Treatment of lupus with pyotropin and other drugs, 98
Wilkes, E. T. Lipolytic activity of blood serum in tuberculosis of children, 25
Willis, H. S., and Krause, A. K. Rate of dissemination of tubercle bacilli in normal and immune guinea pigs, 52
——, ——. ——., Lewis, W. H., and Lewis, M. R. Epithelioid cells of tuberculous lesions, 38
Wingfield, R. C. New lung splint, 108
Winternitz, F., and Ghon, A. Primary tuberculous foci in infants and children, 19
Wolff, G., and Freudenberg, K. Tuberculosis mortality and economic condition, 17

X-ray and clinical diagnosis of pulmonary tuberculosis, 68
X-ray and clinical study of pulmonary lesions, 68
—— diagnosis of pulmonary tuberculosis, Artificial lighting of apices in, 69
—— evidence of tuberculous pulmonary infection in exposed children, 20
—— finding, Pathognomonic, in early pulmonary tuberculosis, 68
—— in pulmonary tuberculosis, 67
—— of lungs with new type of tube, 69
—— —— normal chest, 69
——, Pleural effusions in, 43
—— studies on bronchial movements, 32
—— treatment of dry tuberculous pleurisy, 79
—— —— —— female peritoneal and genital tuberculosis, 103
—— —— —— tuberculosis, 118
—— —— —— —— in children, 21
—— —— —— —— of bones, 89
X-rays, Intrathoracic changes from heavy radiations with, 43

Yabe, T., Shibata, M., Kumagaya, K., and Kobayashi, K. Yabe's modified strain of tubercle bacilli, 48
Yabe's modified strain of tubercle bacilli, 48
Yatren, Treatment of surgical tuberculosis with, 88
Yoshizawa, K. Effect of old tuberculin and tubercle bacilli on experimental tuberculosis, 52

v. Zalka, E. Tuberculous perforation of aorta, 82
Ziegler, O. Rest of lung in treatment of pulmonary tuberculosis, 126
Zschernitz, K. Chickens and pigeons resistant to human and bovine tubercle bacilli, 30
Zühlsdorff, G. Alizarin sputum test, 73
Zwerg, H. Mátéfy reaction in pulmonary tuberculosis, 76
——, ——., and Henschke, E. Serum lipase in pulmonary tuberculosis, 61

JUN 28 1926
Medical Lib.

INDEX NUMBER
THIS NUMBER COMPLETES VOLUME XIII

Vol. XIII JUNE, 1926 No. 6

THE AMERICAN REVIEW OF TUBERCULOSIS

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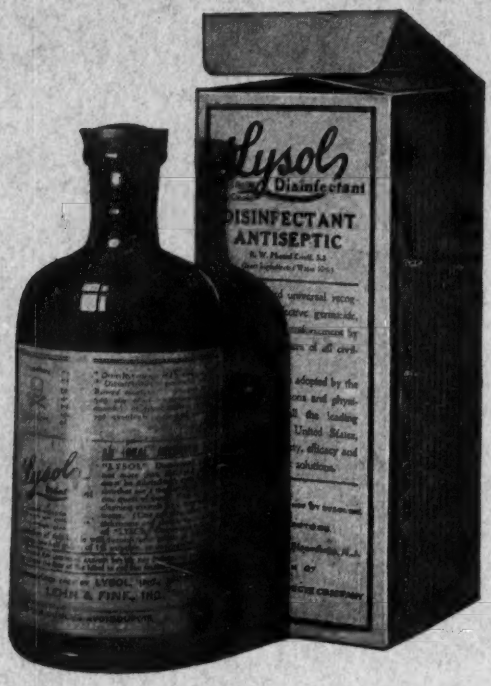
PUBLISHED MONTHLY
at Mount Royal and Guilford Avenues, Baltimore, Md.
By the
National Tuberculosis Association, Business Office, 370 Seventh Avenue, New York City

Made in the United States of America



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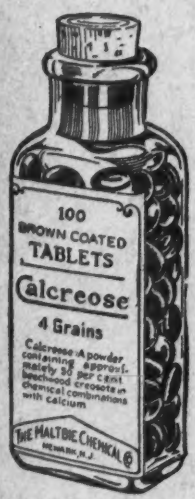

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